MARCH, 1951

Telephone Engineer and Management

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THE NATIONAL TELEPHONE MAGAZINE

Featuring In This Issue —

- 75 Years of Service To The Nation, page 29
- The Markets For New Capital, page 35
- Modern Testing Procedures, page 39

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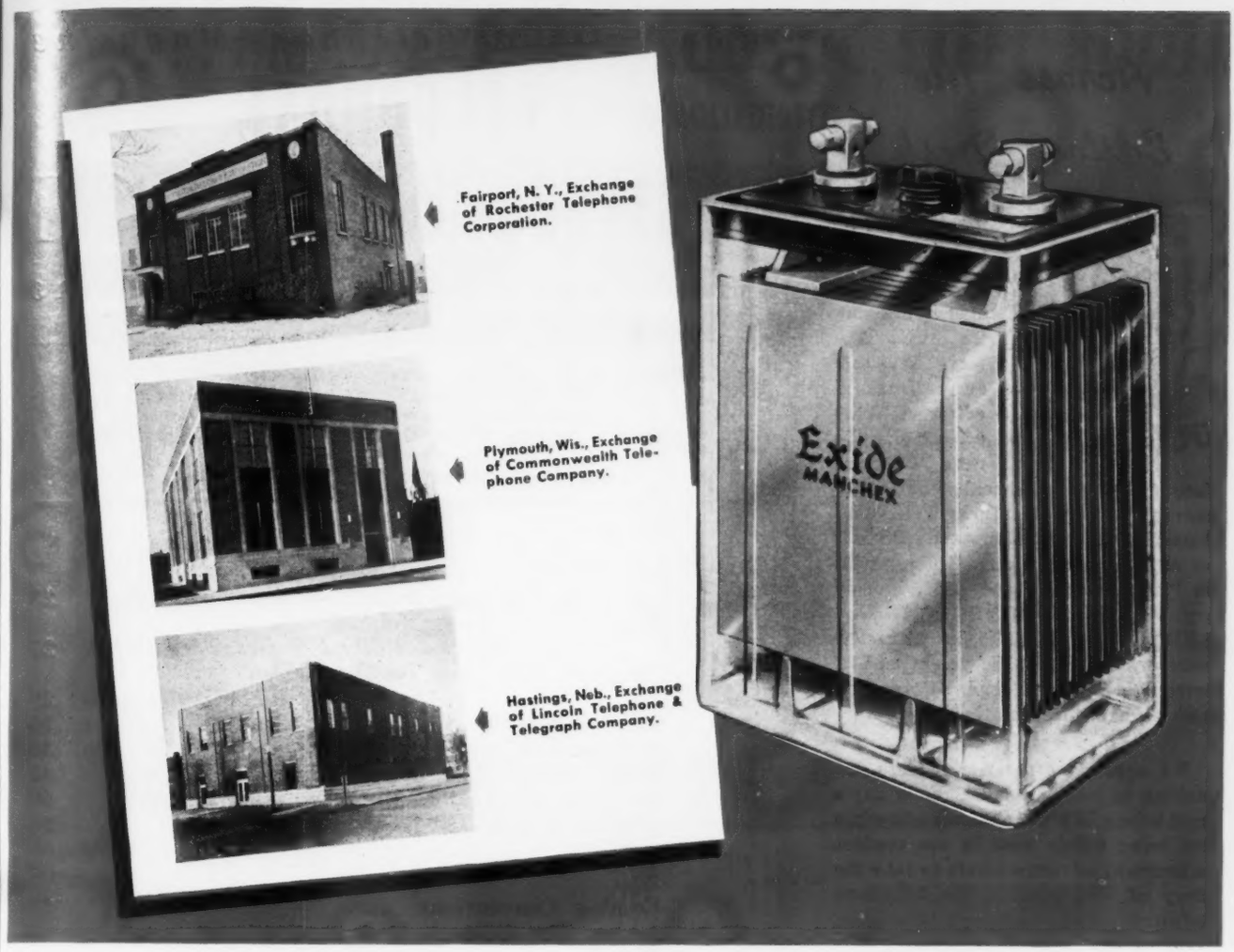
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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2

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The exclusive, long-life manchester plate.

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Heavy terminal posts with copper inserts for extra conductivity for instant high discharge.

Slotted plastic separators, impervious to chemical and electrical reaction.

Plastic spacers for plate alignment.

1888 . . . DEPENDABLE BATTERIES FOR 63 YEARS . . . 1951

Across The Editor's Desk

BILL CORMAN, manager Southland Tel. Co., Atmore, Ala., and contributing editor of Telephone Engineer Publications, was featured speaker at recent convention of the Kentucky Telephone Association. We understand Bill did an outstanding job . . . Bill's article on "Relationships" (page 37, February, 1951, TELEPHONE ENGINEER AND MANAGEMENT) has attracted nationwide attention. If you missed it, better go back and read. It's packed with valuable information.

• • •

We appreciate the use readers are making of our editorials. Each day's mail brings in proof that our editorials are being widely used by our readers in company advertisements to take the story of conditions in the telephone industry direct to subscribers . . . Glad we can help.

• • •

Telephone convention season really went into high gear this month. Texas Association was holding its meeting at Texas Hotel, Fort Worth, as we went to press. Nebraska Association meets March 27-28 at Lincoln Hotel, Lincoln, Neb.

In April:—Iowa Association meets April 3-4 at Hotel Fort Des Moines, Des Moines; Illinois group meets April 19-20, Pere Marquette Hotel, Peoria; Ohio Association meets April 23, 24, 25 at Deshler-Wallick Hotel, Columbus, and Pennsylvania Association meets April 30 and May 1 at Abraham Lincoln Hotel, Reading . . . We hope you are planning to attend the meeting of your association.

• • •

Just 75 years ago the telephone came into being and with it the greatest march of progress the world has ever known. The story "75 Years of Service to The Nation", starting on page 29 of this issue is one we believe you'll enjoy reading.

• • •

We are now processing John S. Reed's articles on "Rebuilding The Rural Outside Plant" for publication in book form. Watch future issues for ordering information.

The National Telephone Magazine

TELEPHONE ENGINEER and MANAGEMENT

MARCH, 1951 **VOL. 55, NUMBER 3**

Editor, RAY W. SMITH • *Advertising Director,* ROY F. SMITH
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FRONT COVER

The telephone carried its first complete sentence on March 10, 1876, when Bell, about to test the transmitter shown on the table spilled some acid and called to his assistant—"Mr. Watson, come here, I want you!" . . . For the complete story read "75 Years of Service to The Nation", which starts on page 29 of this issue.

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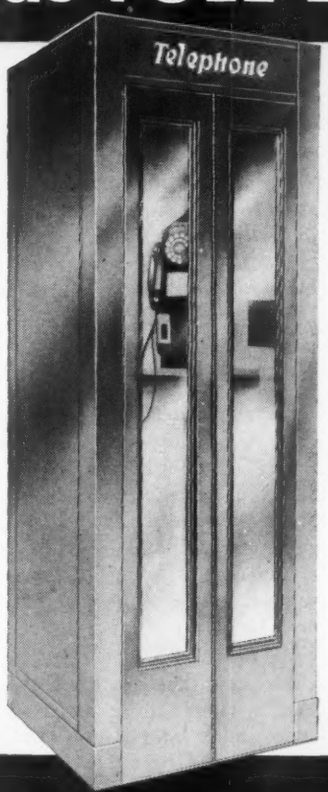
Now... the SHERRON ACOUSTIC STEEL BOOTH

18S—TYPE 1 (COLD ROLLED STEEL)

has FULL LENGTH GLASS DOORS



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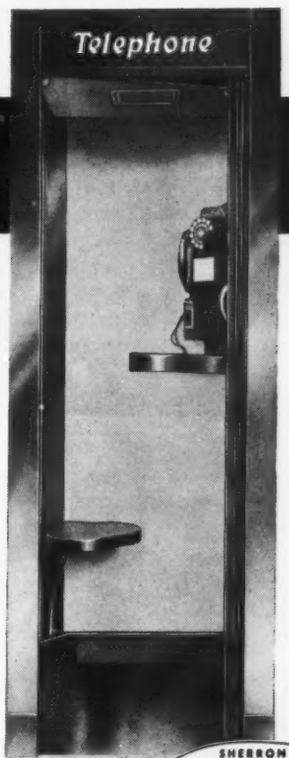

This is the preferred booth for indoor locations. Invitingly attractive. Acoustically correct. Fireproof. Sanitary too...What's more, it won't rust or decay. Write for particulars regarding this and the complete line of Sherron booths.

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"THE OPEN FORUM" has been created to serve as a clearing house for ideas, comments, and suggestions that will be helpful to the Independent telephone industry. Address letters to "The Open Forum", Telephone Engineer Publishing Corp., 7720 North Sheridan Rd., Chicago 26, Ill.

Study Plan For New Reed Articles

To THE EDITORS:—In your Newsletter of January 26, 1951, you had a paragraph on the subject of John S. Reed's series of articles on "*Modern Central Office Maintenance Practices.*" In this paragraph, you stated that in the event we were interested in the study routine that we should so advise you.

Inasmuch as we have a very large subscriber list of your magazine among our employees, and inasmuch as your recommendation has much merit, it would certainly be appreciated if you would have your Editorial Department drop us a letter and inform us of this study routine.

Many thanks for your excellent cooperation.

H. H. BUTLER
PRESIDENT
ILLINOIS TELEPHONE COMPANY
109 EAST MARKET STREET
BLOOMINGTON, ILLINOIS

Thanks, Mr. Butler. Many of our readers liked the study plan idea. Here's how it will work. A study plan will be printed with each installment of Mr. Reed's article on "Modern Central Office Maintenance Practices." This plan will outline topics that should be handled in group discussion, and present questions and answers that will enable all readers of the articles to learn each phase of central office maintenance . . . many companies are entering subscriptions for each of their employees. The articles will start soon.—THE EDITORS.

• • •

"Take A Look At Kelley"

TO THE EDITORS:—In these days when we hear so much about the small telephone company problems—the need for modernization of plant and equipment, the lack of funds, and many other obstacles, it might be well for all of us to take time off to read a page or two of Kelley's book.

My original Kelley's first name was Alfred, but known to his friends as "Ab". Then along came his son, Gene, and later Gene's two sons, Alfred and Grant.

The history of the Kelleys and the Waterloo (Ind.) Telephone Co. is as fine an example of the opportunities and achievements under the good old American system of private and free enterprise as one may find anywhere in any type of business.

It all started in the late 1890's. Ab Kelley owned Waterloo's only self-respecting hostelry, the Locke Hotel.

(*Please turn to page 6*)

HERE'S YOUR INVITATION TO EXPRESS YOUR IDEAS IN "THE OPEN FORUM"

—We want you to consider the "Open Forum" as your department of Telephone Engineer Publications and use it to pass on to the industry your ideas, suggestions, comments and criticisms on any subject pertaining to the telephone industry. Through "The Open Forum" we hope to open up an exchange of ideas that will contribute to the continued success of the Independent telephone industry.

Why not write us a letter? Your letter may give another manager some helpful ideas . . . Or point up a condition that you believe deserves the attention of the telephone industry.

. . . Just address your letter to "THE OPEN FORUM", 7720 N. Sheridan Rd., Chicago 26, Ill.

The National Telephone Magazine

SPRING

TELEPHONE ENGINEER and MANAGEMENT

APRIL, 1951 VOL. 55, NUMBER 4

The SPRING CONSTRUCTION ISSUE of TELEPHONE ENGINEER and MANAGEMENT (April 15)

will be doubly important to telephone men this year

In addition to presenting many new labor and money saving tips on various types of telephone construction work . . . the authors have taken into consideration today's unusual conditions in preparing the feature articles assigned to them.

Some of the features prepared for exclusive use in the SPRING CONSTRUCTION Issue are shown on the partial index of this coming issue in the next column.

Every telephone man should have his own individual copy of this big issue to study and file away for future reference.

The big Spring Construction issue (April 15) plus a full years subscription to TELEPHONE ENGINEER Magazines (24 issues) can be yours for only $2.00. Just send your name, address and check for $2.00 to TELEPHONE ENGINEER & MANAGEMENT, 7720 Sheridan Road, Chicago 26, Illinois, and we will start your subscription with the next issue.

Partial Editorial Index of the SPRING CONSTRUCTION ISSUE

(1) "Drop Wire and Cable Construction Methods", *by John S. Reed.*

In this article Mr. Reed will present new information on drop wire and cable maintenance methods that will be of interest and value to all plant men. The article will illustrate methods of making the BEST USE OF EXISTING PLANT and PRESERVING IT DURING THE PERIOD OF MATERIAL SHORTAGES.

(2) "Lightning", *by H. G. Turner.*

Mr. Turner's article will dig deep into the subject of "Lightning"—explain how it is created and describe proved-in methods of protecting telephone plant against lightning damage. The article will bring you up-to-date on: (1) devices to limit abnormal current, (2) devices to limit voltages, (3) methods of providing lightning reduction and (4) procedure for studying lightning troubles in your operating area.

(3) "Material Conservation Methods", *by John G. Reynolds.*

Conservation of metals and materials is not a new story to the telephone industry. It has been a troublesome factor before and it's becoming a trouble-maker now. In the article on material conservation methods, you'll find practices that will enable you to:

—Increase extent of use of existing facilities,
—Re-use recovered materials,
—Prevent deterioration and failure of equipment,
—Operate your plant at maximum efficiency despite material and equipment shortages.

(4) "Meet MIOBA", *by Myrle Shafer.*

No, it's not a new medicine or something you studied in high school biology . . . The word, "MIOBA" is made up of letters which represent codes for certain key service measurements used in determining quality of plant service from the subscriber's viewpoint. It's a word that's helping many companies improve their service and eliminate costly trouble reports. You'll learn all about "MIOBA" in the April 15 TELEPHONE ENGINEER & MANAGEMENT.

(5) "New Products"

Many new products of interest to telephone men will be pictured and described in detail.

In addition to the above articles, the big Spring Construction and Maintenance Issue of TELEPHONE ENGINEER & MANAGEMENT will feature these established departments: "Questions and Answers", by Jay G. Mitchell, "Small Company Talk", by Bill Corman, "Washington Bureau Reports", by Roland Davies and Fred Henck, "The New Products' Showcase", and "How to Do It Suggestions", by John G. Reynolds.

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Quality **WIRE**

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A scientifically-designed double helix auger that:

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★ Bores clean, straight holes *of the specified diameters—saves concrete*

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★ Eliminates repair trips to shop... hard-facing expense

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"THE MOST PROFITABLE TOOL YOU EVER BOUGHT". Order a PENGO for your present machine . . . *specify* PENGO augers with your new machine.

Available in nine diameters to 36" (actual HOLE sizes) for use with all popular makes of earth boring machines.

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PETERSEN ENGINEERING CO.

460 Kifer Road, Santa Clara, California
(former address, San Francisco)

Frank E. Bohn, board chairman, Home T&T Co., Fort Wayne, Ind.

In the corner of the lobby of the hotel, there was in a booth a telephone for long distance calls only. It was Waterloo's only telephone. Grandfather Ab, like many pioneers of his day, decided that the community was entitled to a telephone exchange and so enlarged the booth by installing a small switchboard alongside. In due time, the Waterloo Telephone Co. was launched with an original list of 35 subscribers.

This was in 1899. Ab continued for a while to manage the hotel leaving the task of building the lines and clearing the trouble to his son, Gene. The company grew and prospered. So in 1910, Ab sold the hostelry, proceeded to build his own building and give all of his time to the telephone business. Before the building was completed, the hotel burned to the ground, but in due time a new board was installed in its new home, at which time the company served 150 subscribers.

Grandfather Ab died in 1911 and his son, Gene, took over. For 15 years or more until his two sons completed their schooling, Gene Kelley ran the company as it continued to grow and expand into the surrounding territory. Since then, the two sons have relieved their father, Gene, from some of his arduous duties and have also assisted in rebuilding and improving the plant. World War II postponed their plans again to modernize their service with the installation of the latest in automatic equipment. However, in 1946 upon conclusion of the war, their plans again proceeded and just recently a Strowger Automatic Switchboard was cut into service giving Waterloo and its environs the very latest in dial serv-

(*Please turn to page* 12)

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

March 15, 1951

Dear Sir:

Rate increase of $78,500 is necessary to give Inter-County Tel. & Tel. Co., Fort Myers, Fla., a return of 7% on rate base computed by Florida Railroad & Public Utilities Commission, regulatory body has ruled. Commission said that hereafter, however, companies submitting rate increase requests will be required to offer schedules of proposed rates. Inter-County company asked commission to grant what it considered adequate rate increase.

In its order, commission said it had taken into account higher costs of operation, including new minimum wage & tax laws, & fact that Inter-County operates in high cost territory. Population density of its territory, agency said, is much lower than that of most Florida telephone companies,& it has suffered heavy hurricane damage.

* * *

Informal conference on revision of telephone separations manual, so as to alleviate present disparity between intrastate & interstate toll rates, will be staged on cooperative basis by FCC with state commissions, represented by Telephone Commissioners' Committee & top staff subcommittee members of National Association of Railroad & Utilities Commissioners (NARUC), on March 27. Bell System will participate in conference.

Separations conference is expected to last from two to three weeks. Bell System companies are slated to make comprehensive presentation of their separations experience & recommendations. Because of availability of mass of pertinent data at American Tel. & Tel. Co. headquarters in New York, conference might be staged in that city instead of Washington.

Importance of telephone separations subject was evidenced by fact that Oregon Commissioner Flagg, NARUC pres., took part in conference between NARUC Telephone Committee & FCC. Telephone Committee Chairman McWhorter stated that his NARUC body had recommended to FCC an informal study of whole separation procedure & any other proposals presented, along with modification of separation formula which was submitted at Phoenix NARUC convention last November. He urged that FCC be prepared at March 27 conference to present any separations ideas of its own, & cited that his Telephone Committee will have entirely different proposal & modification from that submitted at Phoenix.

* * *

Benjamin H. Cravens, vice president & general manager since July, 1945, of the Jamestown (N. Y.) Tel. Corp., was elected president of Jamestown Corporation, March 2, to succeed late John H. Wright.

At same time, board elected A. N. Seward, general manager of Peoples

Tel. Corp. of Butler, Pa., as director of Jamestown Tel. Corp. Mr. Seward is also director of Peoples Tel. Corp., Home Tel. Co., Ridgway, Pa., & Meadville (Pa.) Tel. Co.

Mr. Cravens is president and general manager of Home Tel. Co., vice pres. & general manager of Meadville Tel. Co., & is director of the two companies & of Peoples Tel. Corp. The three Pennsylvania Independents are in same area of country as Jamestown Corp., but are separate companies with different ownership.

* * *

HIGHLIGHTS:- Melvin Gray purchased Hillsboro (Pa.) Tel. Co. from J. D. Hickerson . . . Chenango & Unadilla Tel. Corp., Norwich, N. Y., purchased DeRuyter & Lincklaen Tel. Co. . . . Dwelle Tel. Co., Lake City, Minn., purchased Zumbro Falls (Minn.) Tel. Co. . . . Alabama Tel. Co. will install common battery service at Winfield, Ala. . . . Fred H. Suhre elected pres., Bartholomew County Co-op Tel. Assoc., Columbus, Ind. Co-op filed loan application with REA . . . Officials of Skyline Tel. Co., West Jefferson, N. C., started drive to raise $121,000. Company recently received $1,060,000 REA loan allocation; must raise $121,000 before REA releases funds . . . Pennsylvania Bell Tel. Co. purchased Pottsgrove Rural Tel. Co., Milton, Pa. . . . State Tel. Co. announced plans to install automatic equipment at Coxsackie, N. Y.

Linn County Tel. Co., Lebanon, Ore., announced sale of $50,000 preferred stock . . . Carolina T. & T. Co. started construction of new building at Whiteville, N. C. . . . Milltown (Wis.) Mutual Tel. Co. plans capital stock increase. Funds slated for modernization project . . . Dunn Tel. Co-op, Killdeer, N. D., organized. Directors are: H. L. Malloy, Halliday, N. D.; Frank Murphy, Werner; Carl Sword, Dunn Center . . . Northern Ohio Tel. Co. completed conversion of Oberlin exchange to automatic operation . . . Ohio Associated discontinued service at Kunkle, Ohio, exchange. Subscribers will be served from Pioneer & West Unity exchanges . . . Wm. Bennett elected vice pres., Wellington (Ohio) Tel. Co.; succeeds late Harry Otterbacher.

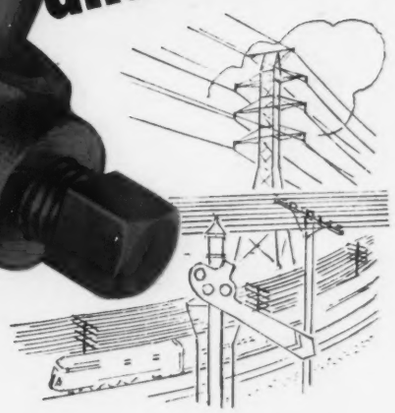
Verdel (Neb.) Community Club purchased Verdel Tel. Co. . . . Joe Knippling, Gann Valley, S. D., is chairman of committee planning merger of companies in Gann Valley locality . . . Harold J. Nohr, mgr., Mountrail Electric Co-op, Parshall, N. D., announced rural residents of Mountrail County are planning formation of rural tel. co-op . . . Peoples Tel. Co., Butler, Pa., announced new buildings at Plain Grove, Volant, Nixon, Prospect & Porterville will be equipped & put in service this year . . . Iowa Independent Tel. Assoc. held district meeting at Ft. Dodge, Ia. . . . Midwest Tel. Co., Parkers Prairie, Minn., installed new swbd. at Miltona, Minn.

Ray W. Smith, Editor

For LOW-COST LIGHTNING PROTECTION that's PERMANENT use Copperweld TRADE MARK Ground Rods and Clamps

Struck 12 times during a single storm and 48 times in one year, the Empire State Building disproves the old saying that "lightning never strikes twice in the same place."

LOOK FOR THE NAME "COPPERWELD" — IT PROTECTS YOU!



YOU NEVER KNOW WHERE, WHEN, OR HOW OFTEN LIGHTNING WILL STRIKE . . . but you can secure safe, permanent and economical grounding protection when you install Copperweld* Ground Rods and Clamps. For every grounding application requiring the use of driven electrodes, these superior ground rods offer you these important advantages:

1. *Molten-Weld*—Permanent interlocking weld between the copper and alloy steel eliminates possibility of electrolytic action. No other ground rod has this inseparable union, accomplished only by the proved Copperweld Molten-Welding process.
2. *Ease of Installation* — Copperweld's extra-strong alloy steel core assures rigidity and easy driving even through very hard soils.
3. *High Conductivity*—Copperweld's thick sheath of pure copper provides excellent electrical conductance. Copper-to-copper contacts throughout insure low resistance.
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5. *Greater Economy* — Longer service life with no maintenance costs.

Start now to reduce outages and insure continuity of service by using Copperweld Ground Rods and Clamps. They provide safe, permanent, low-cost grounding protection at all types of locations—at poles, at towers, at power stations, at substations, at buildings — and for all grounding purposes.

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Here's the ANCHOR for Rural Telephone Lines

CHANCE 6" 8-WAY EXPANDING ANCHOR

You can stock this six-inch 8-Way Expanding Anchor for most rural telephone line guying—save on initial costs—on installation time—and save stocking two sizes (it's designed to replace the Chance No. 62 & 64).

The 6870 has a 70 square inch area and a rated soil-anchor holding strength of 14,000 pounds in class 4 soil (crumbly damp).

This anchor has all the fine features of the famous Chance eight-inch 8-Way. It is "streamlined" to expand quickly—no bolts to cut—holding wires shear with a single blow of the expanding bar. There is no wasted area between blades and the weight of the load is carried by eight blades instead of two or four . . . All good reasons why the Chance 8-Way is on the specs of the biggest anchor users in the telephone industry—reasons why you should specify Chance six-inch 8-Way on *your* next order.

You know it's RIGHT when you specify CHANCE

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CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIES

(*Concluded from page 8*)

ice. The program included in addition to the automatic equipment, a new fireproof building, 150 miles of new wire, 17,000 feet of aerial and underground cable and all new dial telephones, at a total cost of $100,000.

All of this was accomplished by hard work, studious application to the problems at hand, careful planning for the future with the eventual need for private funds ever in mind, and last but not least, good old Hoosier energy and courage under America's system of private enterprise.

"It's a great feeling", said Gene Kelley following the recent cut-over and in the presence of his two sons, "to know that we are performing a service for our community, and giving them the best we know how to offer."

In over a half a century of progress the Kelleys have never lost sight of the importance of good telephone service to their community and have recognized as well that the application of good honest business principles can make it pay. They are first, last, and always telephone men. The Waterloo Telephone Co. has for years been recognized in Northern Indiana as one of the industry's successful and progressive small companies. For these many years it has not onlv maintained a membership in the State and National Associations, but has taken an active interest in both of them.

Especially has Mr. Gene Kelley set the proper example for his sons, for he has been particularly active in the Northeastern Indiana Telephone Association, a district part of the Indiana Association, and is a past president of the former. One sees these days all three of the Kelleys at telephone meetings, both State and District. Their aggressiveness and progressiveness, their intelligence, physical energy, perseverance and mutual loyalty, which no doubt were handed down through two generations from Pioneer Ab, have brought satisfactory results. All of which proves that no small telephone company need create a problem for itself or the industry if managed through the years by such as the Kelleys, from Pioneer Ab and son, Gene, to grandsons, Alfred and Grant.

FRANK E. BOHN
HOME TEL. & TEL. CO.
FT. WAYNE, IND.

Thanks, Frank, for telling us the inspiring story of the Kelleys. The history of "Ab," Gene, Alfred and Grant and the Waterloo Tel. Co. points up the fact that good management gets the job done.—THE EDITORS.

In any **MODERN** switchboard installation—

Photo courtesy of Stromberg-Carlson

the choice is **ACCURATE AUTOMATIC TOLL TIME CALCULATING AND RECORDING**

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Because they quickly save many times their initial cost, CALCULAGRAPH permanent printed records eliminate switchboard detail work, speed service. Accuracy-to-the-second permits collection of all the revenue due on every call. CALCULAGRAPHS are precision instruments featuring high visibility dials, smooth silent lever action. Available in several models, they can be engineered into new equipment by your switchboard builder or easily included in your present set-up. For complete information write Dept. A.

CALCULAGRAPH COMPANY

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THE STANDARD OF ACCURACY SINCE 1892

NEWS BRIEFS

S. W. Bell Surveys Kansas Rural Area

SOUTHWESTERN BELL recently started a survey of territory served by three farmer-owned Independent telephone companies in Pawnee County, Kans., according to Elmer Watters, manager of the company's sub-district office, Great Bend, Kans.

At the annual meeting of the directors of the Pleasant Valley Telephone Co. on Jan. 8, Watters and another representative of Southwestern Bell agreed to survey the rural line areas with a view to taking over the Independent lines if the survey shows such a move is feasible.

The other Independents are the Homestead Telephone Co., which serves an area in southeastern Pawnee county, and Ash Valley Telephone Co., largest of the three independents, whose rural subscribers live in an area north and west of Larned, Kans.

The three Independent lines are served by Bell's Larned exchange. Ash Valley has about 150 subscribers, Pleasant Valley 80, and Homestead about 50.

Charter Granted Norton, Kans. Group

A NON-PROFIT state charter has been issued to the Rural Telephone Service Co., Norton, Kans. Incorporators completing papers in the office of the Kansas secretary of state were: Armond Benoit, C. K. Nelson, Paul N. Mills, Myron G. Johnson, Ernest L. Halderman, E. J. Zohner and Lorenz Wegener, all of Norton.

Independent Sells To Pennsylvania Bell

PURCHASE OF the Pottsgrove Rural Telephone Co., Milton, Pa., by the Bell Telephone Company of Pennsylvania for $2,500 has been approved by the Pennsylvania Public Utility Commission.

The Pottsgrove company serves 92 customers in Turbut and East and West Chillisquaque townships in Northumberland county, and Liberty township in Montour county, through the Bell central office in Milton.

It was reported at the commission hearing that all subscribers of the Rural Company favored the change. Stockholders had previously approved the sale.

Edwin M. Murray, Milton, secretary of the company, said sale of the 34-year-old company became necessary because of increased operational costs. The sale will eliminate an application to the commission for increased telephone rates which would be necessary if operations were continued by the present company.

No Words Wasted

BRADFORD, VT.—This village changed from the rural crank-style to automatic telephones and Fred Doe, 87-year-old storekeeper, made the initial call on the system to Selectman Bernard (Bunny) Crast. His message was: "That underwear you ordered has arrived, Bunny".

South Dakota Co-op Sets Boundary Lines

TENTATIVE boundary lines for the Dunn Telephone Cooperative, Killdeer, S. D., were established by the board of directors and several township workers attending a meeting in Killdeer.

The boundary lines were established to cover the trade areas for the towns in Dunn county and the Grassy Butte trade area of McKenzie and Billings counties. The north boundary of the area is the Little Missouri River and the Ft. Berthhold Indian Reservation. The south boundary includes all of Dunn county north of the Knife River and the Dickinson trade area south of the Knife River which does not have telephone service at the present time. It also takes in parts of townships in Billings county that are included in the Dickinson trade area and the northern part of Billings county that is included in the Killdeer and Grassy Butte trade areas. In McKenzie county, townships 145, 146 and 147 south of the Little Missouri River in ranges 98, 99 and 100 are included.

The board of directors state this is only a tentative boundary line and these lines will be extended if a sufficient number of requests for membership are received outside of the area.

At the time of the meeting over 500 applications for membership had been signed. These represent about two-thirds of the total number of possible members living within the proposed area.

Members of the board of directors are: John Funk, Dodge; H. L. Malloy, Halliday; Frank Murphy, Werner, and Carl Sword, Dunn Center.

Rates Set For Sikes Tel. Company

THE GEORGIA Public Service Commission has approved application of the Sikes Tel. Co., Glennville, Ga., for authority to increase rates for exchange telephone service.

On November 21, 1949, the commission authorized rates for exchange telephone service rendered in Glennville, Ga., by the Sikes Tel Co. The 1949 order prescribed rates for rural telephone service at $2.75 for business and $2.25 for residence, plus a mileage charge of 25c for each two miles beyond the first two miles from the base area boundary.

The Sikes Company, by letter dated January 17, 1951, advised the commission that the Rural Electrification Administration (REA) allocated $207,000 to the company on December 26, 1950 for the purpose of expanding and improving telephone facilities, including extension of service into rural areas of Tattnall County. According to the Georgia Commission, it appears that the REA has stipulated that the proposed loan cannot be authorized unless flat rates for rural telephone service are pre-

-cribed. The company requested authority to establish rural multi-party business rate of $3.50 and rural multi-party residence service of $3.00 per month, irrespective of the distance from the exchange. In addition, the company requested authority to establish a business 4-party rate of $3.50. The commission's order of November 21, 1949 did not prescribe a rate for this class of service.

The commission order approving the requested rates, stated that the "proposed rates for multi-party service will provide approximately the same overall revenue as the rates originally prescribed by the commission in its order dated November 21, 1949, when consideration is given to the mileage charges applicable to the base rate heretofore prescribed."

Minnesota Tel. Co. To Operate Bell Exchange

THE STEPHEN Telephone exchange, which has been operated for many years by the Northwestern Bell Telephone Co., officially changed hands Jan. 24, with the Minnesota Telephone Co. taking over its operation. Announcement of the transaction was made by Elnathan Gates, Minneapolis.

Mr. Gates has held conferences with directors of P. K. M. Electric Cooperative, Warren, Minn., relative to extending the operations of the Warren exchange into additional areas. The exchange is operated by the Marshall County Telephone Co., a subsidiary of Minnesota Telephone Co. The Marshall County company has an application pending with REA for a loan for acquisition and rebuilding of communication lines in the proposed area.

Nebraska Companies Request Rate Boosts

THREE TELEPHONE companies have asked the Nebraska State Railway Commission for monthly rate boosts to offset rising costs of operation.

The Staplehurst Telephone Co. requested a 35-cent per month increase on all classes of service—to produce $1,071 yearly—in order to pay higher salaries to retain employes.

Higher costs "all along the line" was the reason given by the Martel Telephone Co. for a 25 cent per month rate hike on all classes of service.

The Scotia Independent Telephone Co. requested boosts ranging from 25 cents to 75 cents monthly to offset higher taxes and other expenses.

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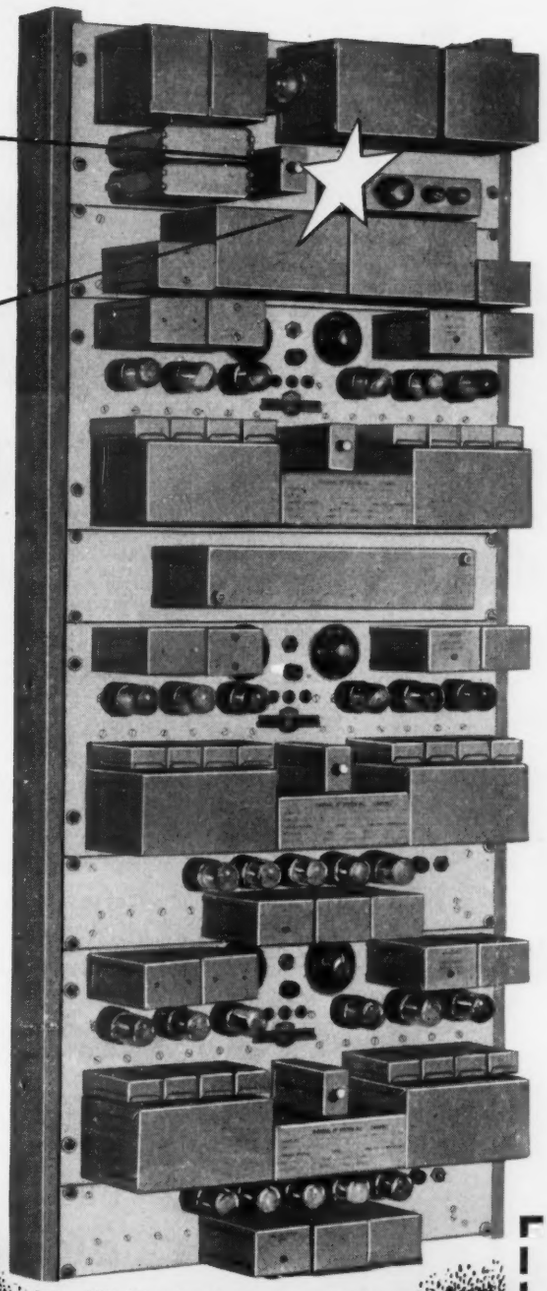

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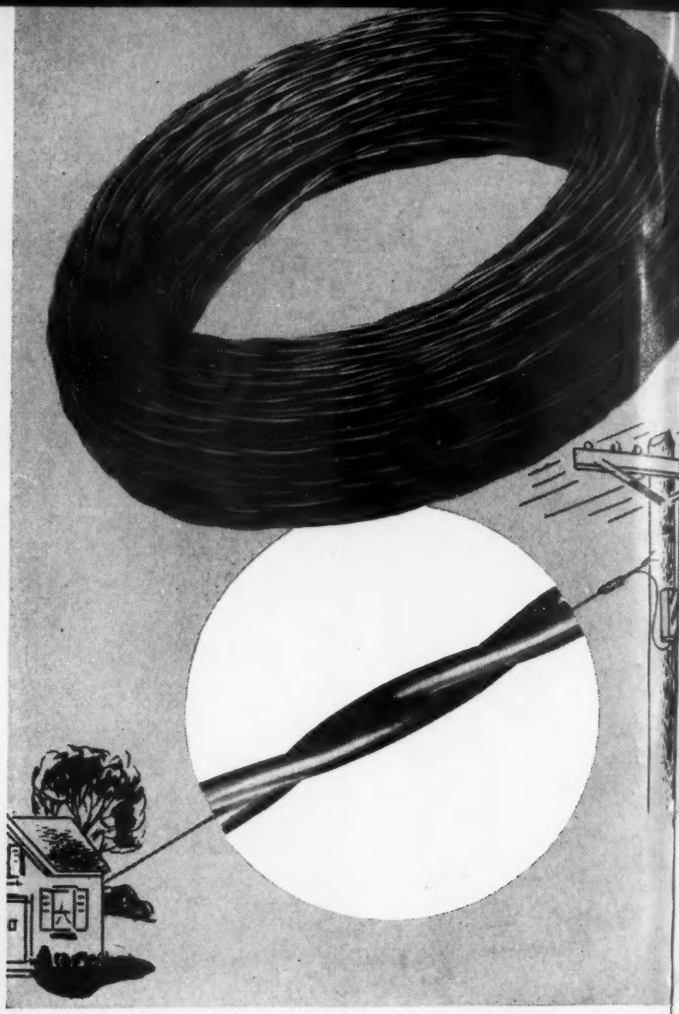

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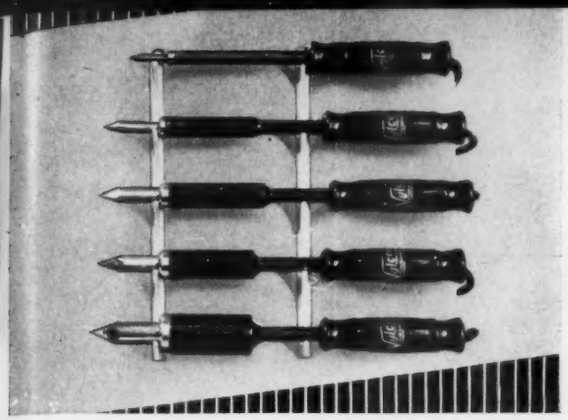

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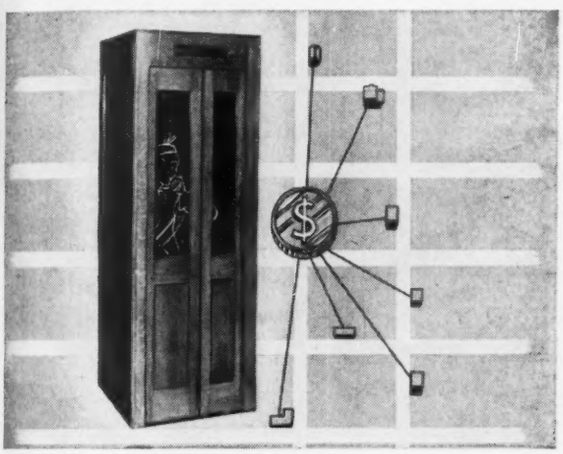

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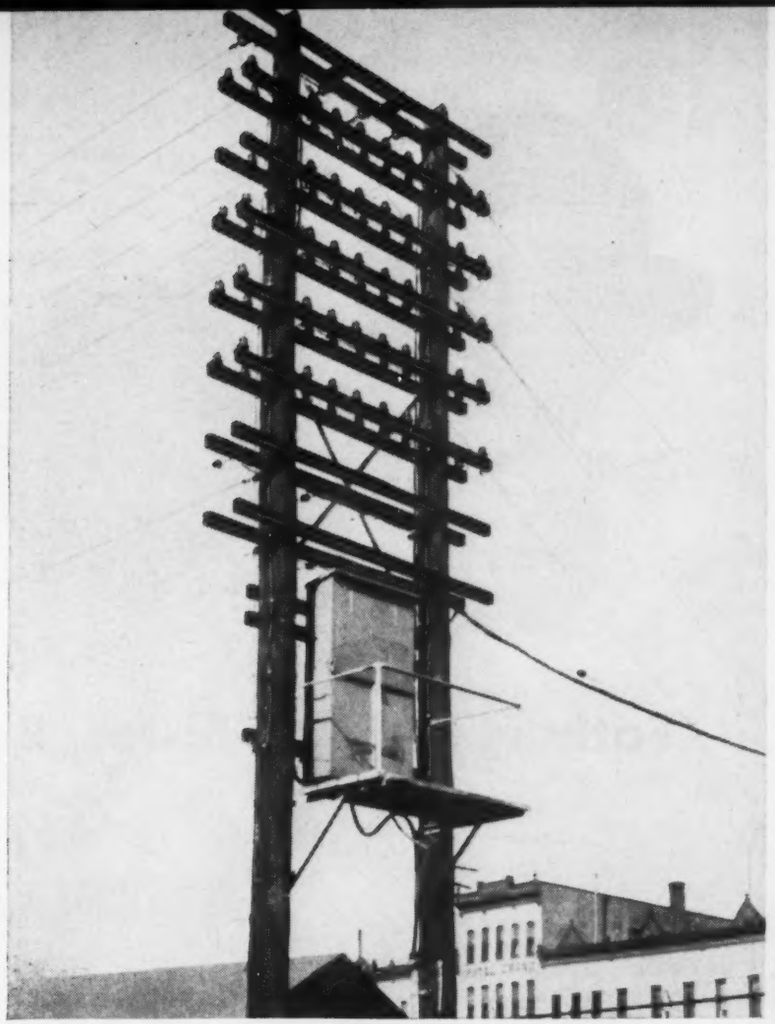

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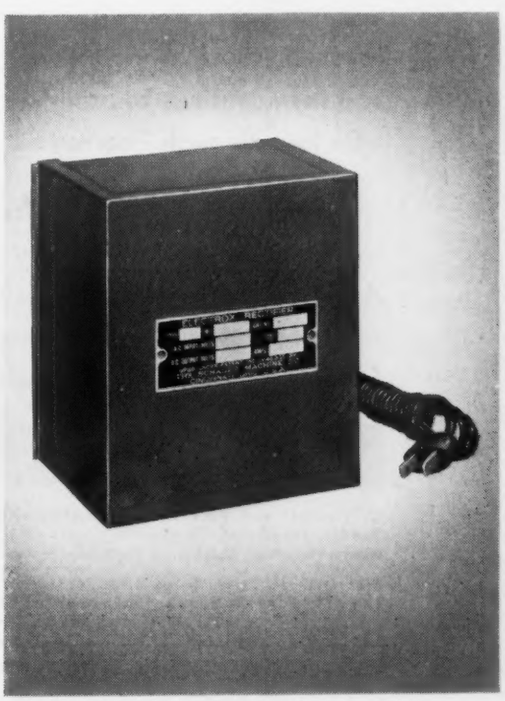

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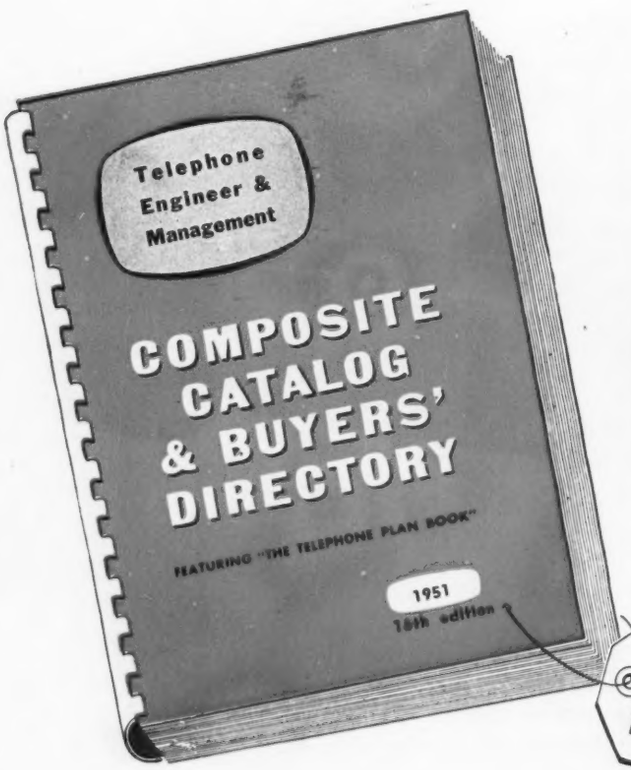

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EDITORIAL

Lessons From REA Telephone Loans

THERE ARE SEVERAL things, of interest to telephone companies, to be learned from REA telephone loan operations to date.

REA's authority to make telephone loans began late in October, 1949. REA has reported that, to the end of 1950—i.e., during the first 14 months—it received 715 applications for telephone loans, aggregating some $84,500,000.

We have heard that some of these applications, including some fairly large ones, were for situations ineligible under the Act. But even if you deduct a sizeable amount for such reason, the remainder—amounting to a good many million dollars—is an impressive figure.

And even if you assume that this was a first rush of applications, and that applications will not run at so high a rate in the future—which is probably true—it must be conceded that there are apparently a lot of people and entities who want to borrow government money for telephone purposes.

During these first 14 months, a considerable part of which REA had to spend in getting together and training an organization to handle telephone loans, REA made 67 allocations of telephone loans, aggregating about $23,400,000. Of these, about $10,200,000 were for 43 commercial telephone companies and about $13,200,000 were for 24 co-ops.

All this, we think, indicates two things. One is that co-ops are active in applying for and obtaining REA loans. The other, that REA will make allocations at faster rate in the future than in the past—as long as the money holds out, anyway.

As to money, we have seen figures (which did not come from REA) indicating that REA had unallocated loan funds of about $17,000,000 as of February 1, 1951. In the President's budget message to Congress, appropriations to REA for telephone loan funds for the fiscal year 1952—beginning July 1, 1951—were cut sharply to $9,000,000, which sum could be even further reduced by Congress. But if this full amount is allowed REA, it will presumably have available about $26,000,000 for telephone loans for the 16 months from February 1, 1951 to June 30, 1952.

REA has already allocated several million dollars of this loan fund, including one allocation of $2,065,000—the largest single allocation yet—to one co-op.

There seems to be some possibility, therefore, that if REA proceeds to make loan allocations as rapidly as it can for approved applications on hand and received, then REA may wind up before mid-1952 in the embarrassing position of being a governmental lending agency with no money to lend.

There is another aspect to this whole situation which should interest telephone companies operating in rural areas. Calculations show that REA loan allocations to the end of 1950 average something more than $300 per telephone for telephones to be given improved service and telephones to be added. This is the amount to be loaned by REA and does not include the equity to be provided by the borrower in addition to the loan.

REA-financed telephones must bring in enough revenue to pay not only their costs of operation and maintenance, proper provision for depreciation, and interest, but also to pay off the debt to REA. This, it seems clear, will require rural telephone rates substantially higher than the general level of such rates in the past.

The lesson here is that if commercial telephone companies are to keep up with the procession, their rural service must be as modern as that which will be supplied by REA-financed co-ops. But, for such service, they will have to obtain considerably higher rates than most of them have been obtaining for rural telephone service in the past.

It also seems fairly clear that where commercial telephone companies do not keep up with the procession, many of them will find REA-financed co-ops knocking at the door of their operating territories as long as REA has telephone money to lend.

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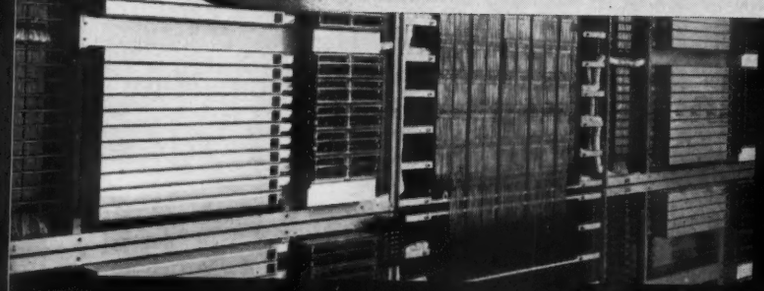

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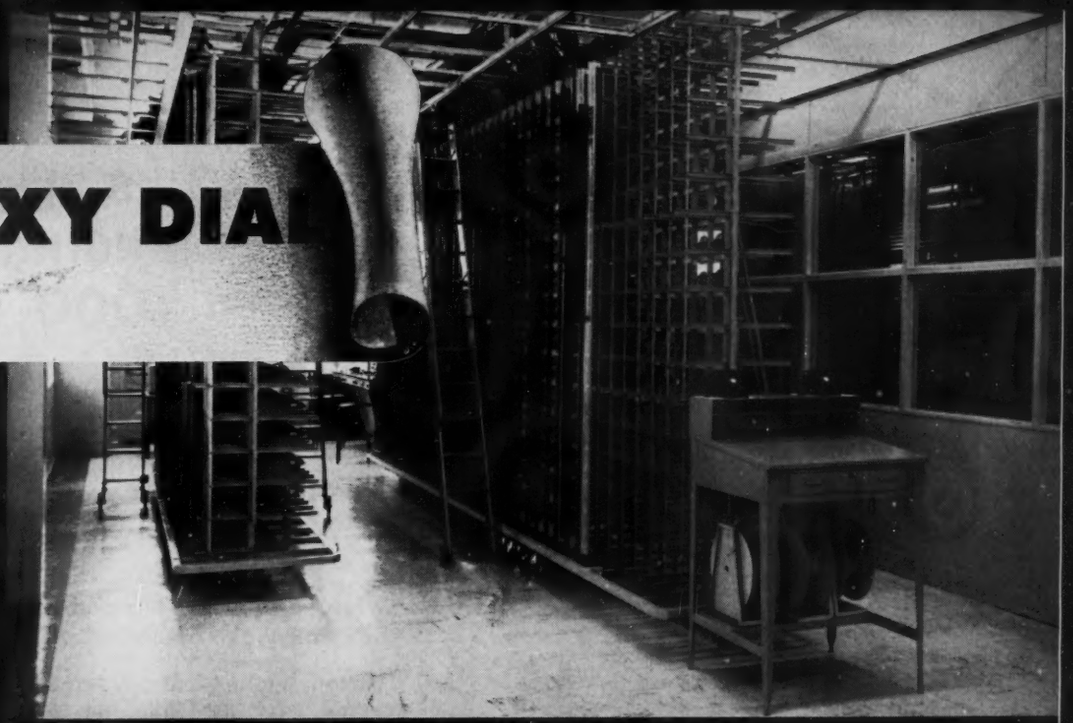

Terminal room showing switch equipment through glass panel

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The Cut-Over—December 2, 1950

L. to R.: Mrs. Miller, Mr. Miller, Mrs. Bodine, Mr. McHenry shown watching the cut-over.

Terminal Room ▶

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OVER 40 YEARS SERVICE TO THE TELEPHONE INDUSTRY

Washington Bureau Reports

By Roland Davies and Fred Henck

INFORMAL conference on interstate telephone rate reductions scheduled for March 27 . . . Massachusetts Supreme Judicial Court declares return of less than 6.23 per cent on total capital (debt and equity) is "below level where confiscation begins . . ."

ALTHOUGH THEY doubtless will produce little in the way of publicity for any one concerned—and this column has long expressed sympathy to reporters covering the Federal Communications Commission for the wire services and daily papers who endeavor to report, in a few paragraphs, complex common carrier matters so they will be reasonably intelligible to the casual reader—developments in what started to be a "floor show" type of general hearing on interstate telephone rate reductions appear to be shaping up in a way which should lead to equitable action without the elements of a Roman circus.

In line with the FCC's announced decision to carry on an informal conference with the National Association of Railroad and Utilities Commissioners on separations matters, it has been announced that a joint FCC-NARUC meeting on the subject will take place starting Tuesday, March 27, either in Washington or New York.

Although initially it had not appeared that the conferences would be particularly fruitful, in view of the FCC's apparently adamant opposition to the separations proposal endorsed at last year's NARUC convention, Chairman Matt L. McWhorter of the Georgia Public Service Commission and of the NARUC Special Telephone Committee has said his group will have an entirely different proposal ready for the joint sessions.

Chairman McWhorter told TELECOMMUNICATIONS REPORTS, Washington correspondents for TELEPHONE ENGINEER, that his group has recommended to the Commission an informal study of the whole separations picture, including the Phoenix convention plan to transfer $200 million in plant investment and $20 million in annual expenses to interstate toll, any modifications of that plan, and any new separations proposals. He also urged the Commission to be prepared to present any plans of its own for separations procedures aimed at reducing the disparity between interstate and intrastate toll rates, and to put the interstate-intrastate separations picture on a more equitable basis.

Commissioner McWhorter added that his group "is very anxious and is certain that the informal separations conference and study will be concluded with a constructive plan in time so as not to interpose any delay in the FCC long-distance rate proceeding, now scheduled for July 16." The NARUC Telephone Committee Chairman added, however, that the separations review in all probability will produce results obviating the FCC long-distance rate investigation.

All of this, of course, is of critical importance to Independent telephone companies in their divisions of revenues or interstate toll business. There undoubtedly will be more sound and fury before the matter finally is decided. But it seems obvious that, when under our federal-state form of government the states are entrusted with the responsibility of regulating local and intrastate telephone service for which the public pays billions of dollars annually, that the anomaly of long-distance rate reductions, at a time when the need for intrastate rate increases has been demonstrated time and again throughout the nation, cannot be permitted, at least before extensive changes have been made in the apportionment of revenues, expenses, and investment within the jurisdiction of the federal agency and of the 48 states.

Rates

PROBABLY THERE have been few instances in the regulatory history of the United States in which the positions of public utilities have been upheld so continuously by state courts, including a large number of state supreme courts, as in the current series of post war telephone rate increase proceedings.

The past few weeks has been no exception, except that an even higher tribunal, the U. S. Supreme Court, has come into the picture. Since the nation's highest judicial body gave no reasons for its action, the field is wide open for interpretations by any lawyer who cares to sit down with his library. But the cold facts of the decision speak for themselves.

It has been apparent for some time, since intrastate rate cases have been carried to state supreme courts repeatedly, and the companies have been upheld with one single exception, that the opponents of telephone rate boosts needed by the companies have not cared to carry their appeals the last mile, to the U. S. Supreme Court.

This, however, did not deter the National Farmers Union, which has a rather left-wing reputation, when its fight against the South Dakota rate boost of the Northwestern Bell Telephone Co. fell on its face in the courts of that state. After the commission had rejected any rate increases, the company went to the courts, won its full rate application, and was upheld by the state's highest judicial body.

At that point, the Farmers Union

went to the U. S. Supreme Court, stating that a federal question was involved, since the South Dakota state Supreme Court had based its decision in part on the due process of law clause of the Fourteenth Amendment. It carried on the South Dakota commission's attack on the separations methods used by Northwestern Bell, license contract payments to the American Telephone & Telegraph Co., and similar matters.

The final briefs in the case had been with the Supreme Court less than a month when it made its final decision. The decision was short and to the point. It simply denied the Farmers Union's request for a writ of certriorari, meaning, in effect, that it declined to review the case. So, at least in the first telephone rate case to reach the Supreme Court in the postwar period, that is that.

Another court decision which has attracted considerable attention in Washington circles interested in the telephone field is that of the Massachusetts Supreme Judicial Court, in acting in a case in which a single justice of the court, appointed earlier to hear preliminary aspects of the matter, permitted the New England Telephone & Telegraph Co. to put into effect its full rate increase request.

Terms of the decision were important, since the court endorsed $14 million of the $15 million sought by the company as the rock bottom rate increase to stave off confiscation. But some of its comments also were of very general application.

The court declared, "a net return of less than 8.5% on stock capital or less than 6.23% on the sum of both kinds of capital (debt and equity) is below the level where confiscation begins. It does not follow that a considerably higher return might not fall within the range of reason and might not have been allowed by the Department (of Public Utilities) but our duty is performed by marking the line of confiscation."

Massachusetts' highest court declared, "Here is one of our greatest and most necessary public utilities. It cannot be permitted to fail in its service to meet an insistent public demand. It did so by borrowing $120 million on demand notes from a source which fortunately was available to it. It must repay this money in the near future. It cannot expect to retain this borrowed money indefinitely as a part of its capital structure. Its only means of repayment is by obtaining new capital. Concededly, it must not increase its debt ratio. It must therefore sell a substantial amount of stock. On the evidence, it can do this only if it is allowed a return on stock capital substantially larger than the 6% allowed by the Department."

NPA Issues MRO Order

IT APPEARS that a task group of industry representatives, set up a few weeks ago by the domestic communications operating industry advisory committee to the National Production Authority, has a task on its hands immediately, following the issuance by NPA of its MRO (maintenance, repair, and operating supplies) order.

Of the two task groups set up by the NPA group, one was specifically assigned to study the MRO order (at that time the order had not yet been issued) and weigh its effect on the communications industry. Each task group is composed of a representative from the Bell System, one from the Independent telephone field, and a third from the Western Union Telegraph Co.

What the MRO order amounts to is this. Any organization, regardless of what industry or service it is a part, may use "defense order" ratings to obtain repair and maintenance supplies—but only for the same dollar amount of such supplies that it used in 1950. The organization has the option of fixing its quarterly quota either by using the figure for the same quarter last year, or by dividing its annual usage by four and using that quota in each quarter.

Once it decides which option to use (quarter-by-quarter or one-fourth of the annual total) the organization cannot switch to the other method without written NPA approval. Once it uses a "DO" rating, the quota applies to all repair and maintenance supplies ordered, whether a rating is used or not. It may apply to NPA for an increase in its quota, but that is apt to be a rather slow process.

Telephone industry observers point to the following important factors, as far as the communications industry is concerned, which the MRO order does not take into account: (1) dollar equipment and supplies costs have risen, and the same dollars now do not buy the same amount of supplies and equipment as they did last year; (2) repair and maintenance needs rise with plant extensions, and most companies are steadily putting more plant into service to meet service demands; (3) storms do not understand about MRO orders, and are just as apt as not to be more damaging in succeeding years or quarters than they were in 1950.

Thus it is assumed that the task group will be required to recommend modifications which will permit essential communications services to extend "DO" ratings to their repair and maintenance orders.

One group getting a break under the MRO order is the small company using less than $4000 a year in MRO supplies. In effect, the quotas do not apply until $4000 a year is spent, so that a company using that amount or less can extend "DO" ratings to its orders without further complications. Also, paper work is reduced, since reports to NPA are not required until the quota tops $1000 a quarter.

Whatever new taxes are approved by Congress during the current year, it now appears that at least the bad news will be postponed for a while.

The decision of the House Ways and Means Committee to recall Secretary of the Treasury John W. Snyder for further testimony on the Truman administration's tax aims means, in effect, no new tax statute until probably late summer. This picture, it is felt, will change only if federal revenue needs bounce up still further through further outbreaks of hostilities or all-out war.—THE END.

Coming Conventions

Nebraska Telephone Association, Lincoln Hotel, Lincoln, Mar. 27-28.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, Apr. 3-4.

Illinois Telephone Association, Hotel Pere Marquette, Peoria, Apr. 19-20.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, Apr. 23-25.

Pennsylvania Independent Telephone Association, Abraham Lincoln Hotel, Reading, Apr. 30 and May 1.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 9-10.

United States Independent Telephone Association, Executives' Conference, Greenbrier Hotel, White Sulphur Springs, West Virginia, May 14-15.

Kansas Telephone Association, Kansan Hotel, Topeka. (Note change in location). May 22-23.

New York State Telephone Association, Mark Twain Hotel, Elmira, June 6-7.

Washington Independent Telephone Association and Oregon Independent Telephone Association, Hotel Multomah, Portland, June 15-16.

Tennessee Independent Telephone Association, Sept. 19-20, Nashville.

The dramatic moment (1) in the telephone history came March 10, 1876, when Watson reported excitedly —"Mr. Bell, I heard every word you said—distinctly!"

75 Years Of SERVICE

1876 To The Nation 1951

Practically within the span of three-score years and ten, the Bell Telephone System and the Independent telephone industry have built to service America the best communication service in all the world. . . .

By John G. Reynolds

Managing Editor,
Telephone Engineer Publications

A WEARY MOTHER answers the telephone's insistent ring and says "Hello" with a dull, slow voice. She pauses a moment and all the lines of worry vanish from her face, chased away by high notes of gladness and joy as she exclaims—"*Calling from Japan!!! Oh, Bill,—thank God you're alright!*" . . . Outside the city limits of a small town a farmer turns the crank on his wall telephone, waits for the operator to answer and bellows—"*Are you there, Mabel? You'd better put the bell on Jim Sykes. Tell him to get his fire department out here or my barns and the south end of Cork County are going to be burnt to a fare-thee-well.*" . . . In the main office of a busy factory a plant manager exclaims—"*This won't wait for a letter. Let's get the mill on the phone and get that material started rolling to our plant before we have to shut down.*" . . . Out on the busy state highway a state trooper stops at the scene of a collision, makes a quick survey of the injured and reaches for a mobile telephone—"*This is car* 39. *I'm at Grand Forks crossing, north of Clearville. Phone Clearville Hospital and get an ambulance rolling. We've got a collision. A man and a woman are badly injured. . . .*"

In every second of every minute the telephone, that often *taken-for-granted* servant of all the people, brings gladness to many, speeds aid to the troubled, does its part to keep the productive wheels of this country running at full speed and moves in as the capable helper when disaster strikes. Yet it was only 75 *years* ago, on *March* 10, 1876 that a simple sentence "*Mr. Watson, come here, I*

want you" started its path toward historical renown as the first recognizable words to be spoken over the first practical telephone setup.

Those seven short words heralded the birth of the telephone and marked the start of progress in communications that has never halted.

Looking back through the record of that historic occasion we find that the locale of the event was Boston. The exact location, a little attic at No. 5 Exeter Place in Boston. The principals in this real life drama, *Alexander Graham Bell*, young Scottish teacher and experimenter, and his colleague *Thomas A. Watson*, an expert young electrician. They had been designing experimental telephone transmitters and receivers in an attempt to transmit the voice electrically over wires.

Bell Meets Watson

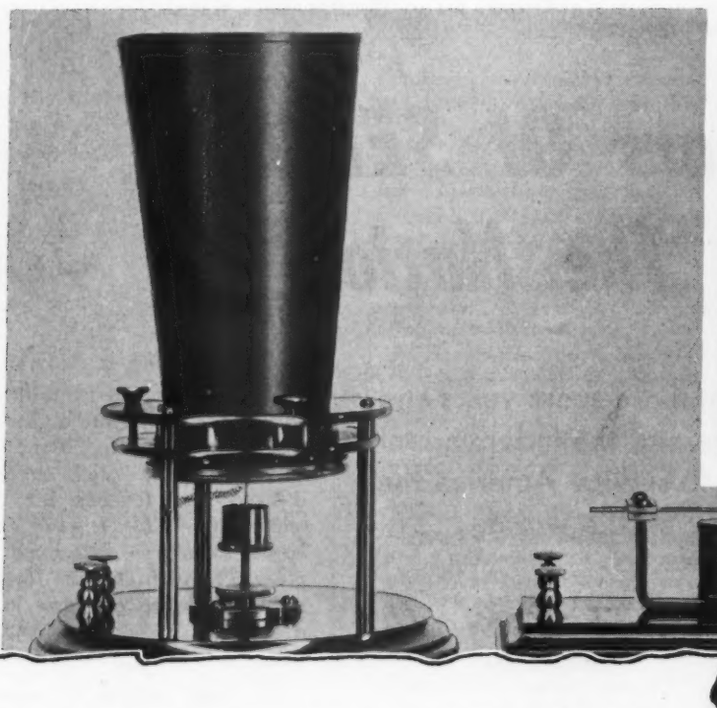
THE TWO MEN met in 1874 while Watson was working in the electric shop of Charles Williams, Jr., 109 Court Street, Boston, making an experimental torpedo exploding apparatus. In his memoirs on "The Birth and Babyhood of the Telephone," Watson describes his meeting with Bell as follows: *"One day when I was hard at work, a tall slender, quick-motioned man with a pale face, black side whiskers and drooping mustache, big nose and high sloping forehead crowned with bushy, jet black hair, came rushing out of the office and over to my work bench. It was Alexander Graham Bell, whom I saw then for the first time. He was bringing to me a piece of mechanism which I had made for him under instructions from the office. It had not been made as he had directed and he had broken down the rudimentary discipline of the shop in coming directly to me to get it altered. . . ."*

The mechanism that resulted in Watson's first meeting with Bell was a receiver and transmitter of Bell's "Harmonic Telegraph," an invention with which he was then endeavoring to win fame and fortune. It was a simple affair utilizing the law of sympathetic vibration, and Bell expected to perfect it and make it possible to send six or eight messages on a single wire at the same time without interference.

The essential parts of the transmitter and receiver were an electromagnet and a flattened piece of steel clock spring. The spring was clamped by one end to one pole of the magnet. Its other end was free to vibrate over the other pole. The transmitter had make-and-break points like an ordinary vibrating bell which, when the current was kept on, kept the spring vibrating in a whining pitch corresponding to the pitch of the spring. When the signalling key was closed, an electrical copy of that whine passed through the wire and the distant receiver.

There were, for example, six transmitters with their springs tuned to six different pitches and six receivers with their springs tuned to correspond. Theoretically, when a transmitter sent its electrical whine into the line wire its own faithful receiver spring at the distant station would wiggle sympathetically but all the others on the same line would remain coldly quiescent. Even when all the transmitters were whining at once through their entire gamut, making a row as if all the miseries this world of trouble ever produced were concentrated there, each receiver spring along the line would select its own from that sea of troubles and ignore all the others.

It appeared to be a simple, sure-



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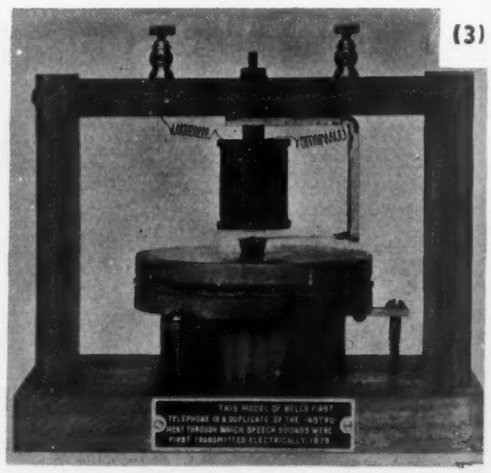
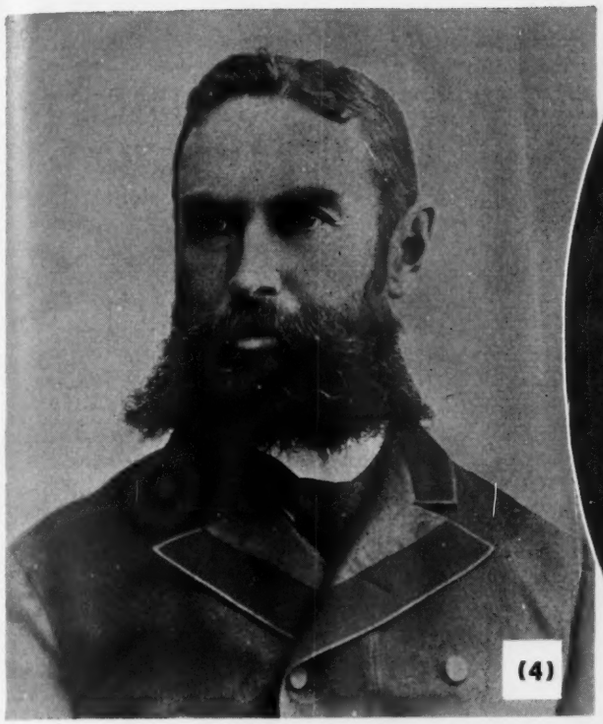


(3)

When Watson, working in another room at Bell's boarding house, 5 Exeter Place, Boston, heard Bell's call for help, he was adjusting the tuned reed (2-right). The experimental work of nearly a year had passed between these instruments and the earlier model (3) over which speech sounds had been transmitted in April, 1875. When the transcontinental line was opened in 1915, Bell talked to Watson over a replica of the instrument shown above as (3).



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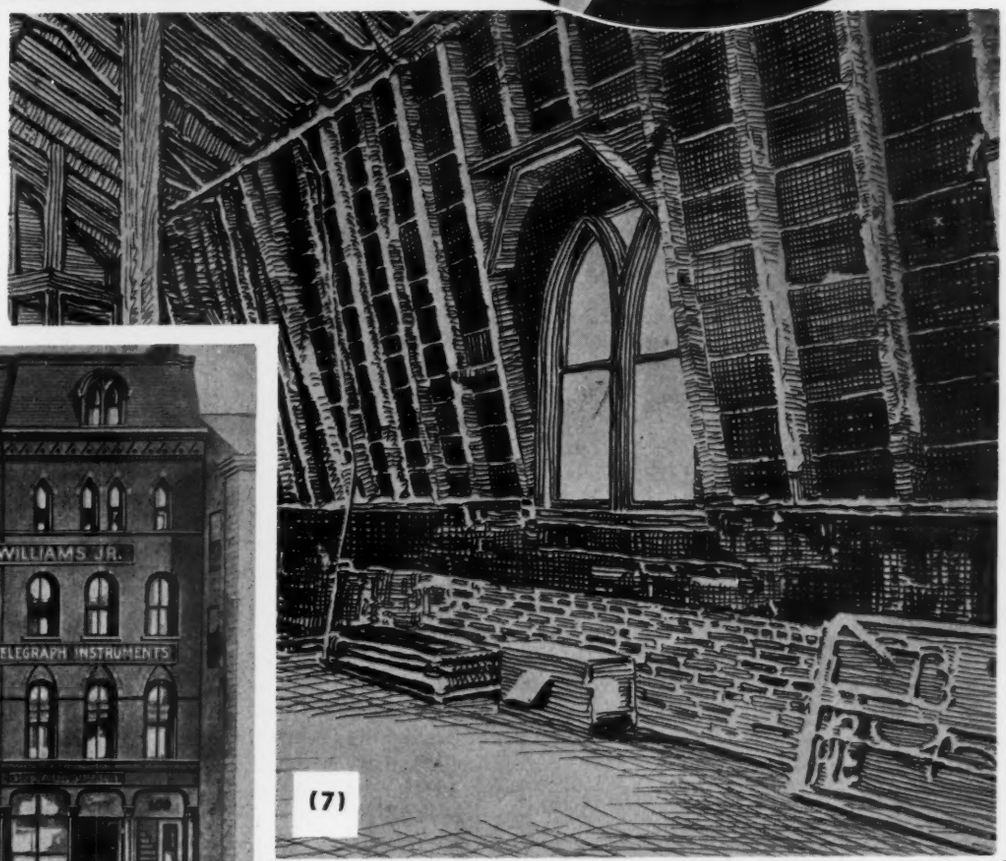

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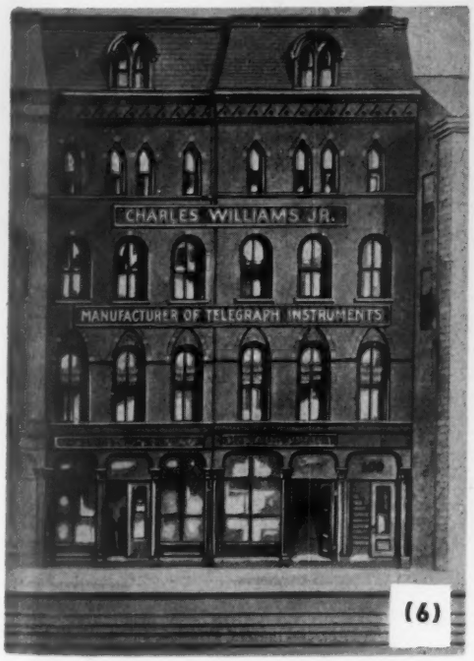


(6)

Experiments with the telephone were carried on by Bell during the Boston University days, largely with financial aid provided by Hubbard and Thomas Sanders (4). Sanders' son George was one of Bell's pupils . . . Associated in the experimental work was Thomas A. Watson (5). A skilled mechanic and electrician, Watson made Bell's apparatus and was the original "research, engineering and repair departments" . . . The exterior of the Charles Williams, Jr., shop (6), at 109 Court Street, Boston, where the first telephone was made: and the attic room (7) in the shop where experiments were conducted. It was in this room, in April 1875, where Bell and Watson verified Bell's belief that speech sounds could be transmitted over wire.

to-work invention. Just break up those various whines into the dots and dashes of Morse messages and one wire would do the work of six and the "Duplex" telegraph that had just been invented would have been beaten to a battered frazzle. Bell's reward would have been immediate and rich. The "Duplex" had been bought by the Atlantic & Pacific Telegraph Company giving them a great advantage over their only competitor, the Western Union Company, and Western Union would have bought Bell's invention providing an easy solution to his financial problems.

Of course Bell's plan was all theoretical and it was mighty lucky for Alexander Graham Bell that it was. If his harmonic telegraph had been a well behaved apparatus that always did what its parent wanted it to do, the speaking telephone might never have emerged from a certain marvelous conception that had been surging back of Bell's high forehead for two or three years.

Bell Surprises Watson

WATSON MADE a half dozen pairs of the harmonic instruments for Bell. Bell was consistently surprised when he discovered they didn't work as well as he expected. The cynical Watson wasn't at all surprised. He had never seen anything originally work the way the inventor thought it would. However, Bell wasn't discouraged in the least and a long course of experiments followed that gave Watson a steady job and brought him into close contact with Bell.

Perhaps the first indication Watson had of Bell's idea for transmitting speech over wire came one evening while they were resting. Bell turned to Watson and said, "*I want to tell you of another idea I have which I think will surprise you . . . If I could make a current of electricity vary in intensity, precisely as the air varies in density during the production of sound, I should be able to transmit speech telegraphically.*"

Bell then sketched an instrument he thought would do the job but Bell and Watson did not make the instrument. It was too costly. The chances of its working were so uncertain that Bell's financial backers Gardiner G. Hubbard and Thomas Sanders were unimpressed. In fact they were insisting that Bell perfect the harmonic telegraph, claiming that invention would provide him with money and leisure time to build "air castles like the telephone . . ."

As a result the harmonic telegraph became a nightmare to Bell and Watson. Watson blamed his lack of mechanical skill for the poor operation of an invention that was apparently simple and Bell came close to complete discouragement. But the spring of 1875 proved to be nothing more than the dark hour just before the dawn.

A Great Day In Telephone History

IF THE EXACT time could be fixed —the date when the conception of the undulatory or speech-transmitting current took its perfect form in Bell's mind would be the greatest day in the history of the telephone, but certainly *June* 2, 1875, must always rank next. As Watson later described it—"*On that day the mocking fiend inhabiting that demonic telegraph apparatus, just as a now-you-see-it-and-now-you-don't sort of satanic joke, opened the curtain that hides from man nature's great secrets and gave us a glimpse as quick as if it were through the shutter of a snap-shot camera, into that treasury of things not yet discovered.*"

Of course the "imp" didn't do this in a kindly, helpful way. At first the "imp" tantalized Bell and Watson to prove that man is often too stupid to grasp a secret even if it is revealed to him. But the "imp" hadn't properly estimated Bell and Watson. The glimpse was enough to let Bell see and seize the very thing he had been dreaming about and drag it out into the world of human affairs.

The little point that became so big popped out of Bell's experiments with the harmonic telegraph. Bell discovered the reason messages became mixed was inaccuracy in the adjustment of the pitches of the receiver springs to those of the transmitter. Bell was in the habit of observing the pitch of a spring by pressing it against his ear while the corresponding transmitter in a distant room was sending its intermittent current through the magnet of that receiver. He would then manipulate the tuning screw until that spring was tuned to accord with the pitch of the whine coming from the transmitter. All of this experimenting was carried on in the upper story of the building at 109 Court Street where Bell and Watson had a wire connecting two rooms that were perhaps 60 feet apart.

On the afteronon of *June* 2, 1875, Bell and Watson were hard at work on the same old job, testing some modification of the instruments. Things were badly out of tune that afternoon in the hot garret. The instruments were operating imperfectly. Enthusiasm was about exhausted. Tempers were edgy, ready to flash into angry words. Watson had charge of the transmitters, setting them squealing one after the other. Bell was retuning the receiver springs one by one, pressing them against his ear. One of the transmitter springs Watson was attending stopped vibrating. Watson plucked it to start it again. It didn't start. Watson kept on plucking it. Suddenly he heard a shout and Bell came into the room with a rush, demanding, "*What did you do then? Don't change anything. Let me see.*"

Mr. Watson showed him. It was very simple. The contact screw was screwed down so far it made permanent contact with the spring so that when the spring was snapped the circuit had remained unbroken while that strip of magnetized steel by its vibration over the pole of its magnet was generating that marvelous conception of Bell's—*a current of electricity that varied in intensity precisely as the air was varying in density within hearing distance of that spring!*

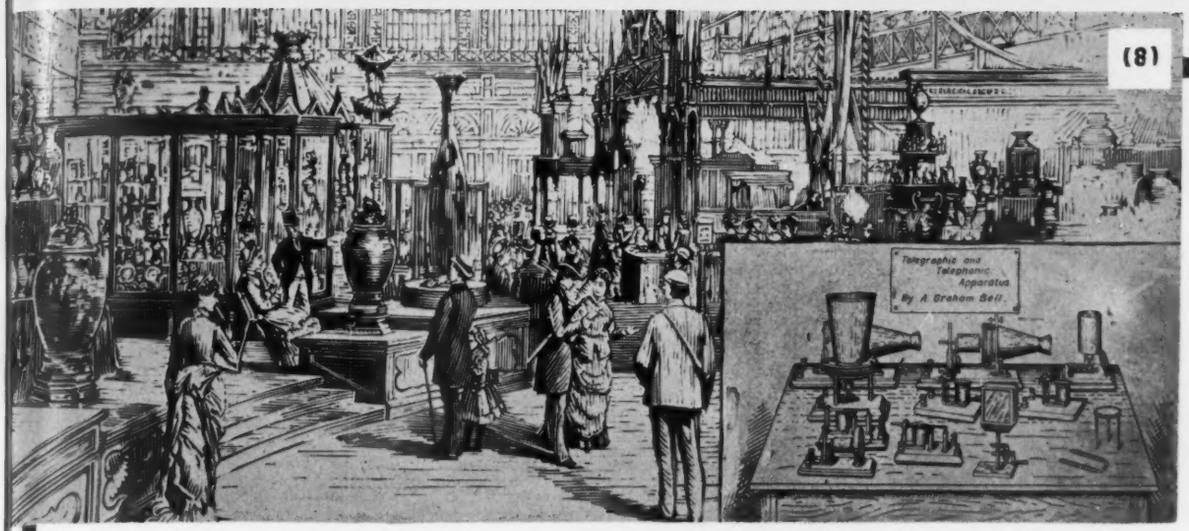
That undulatory current had passed through the connecting wire to the distant receiver. Fortunately the receiver was a mechanism that could transform the current back into an extremely faint echo of the sound of the vibrating spring that had generated it. But what was more fortunate, the right man had that mechanism at his ear during that fleeting moment and instantly recognized the transcendent importance of the faint sound.

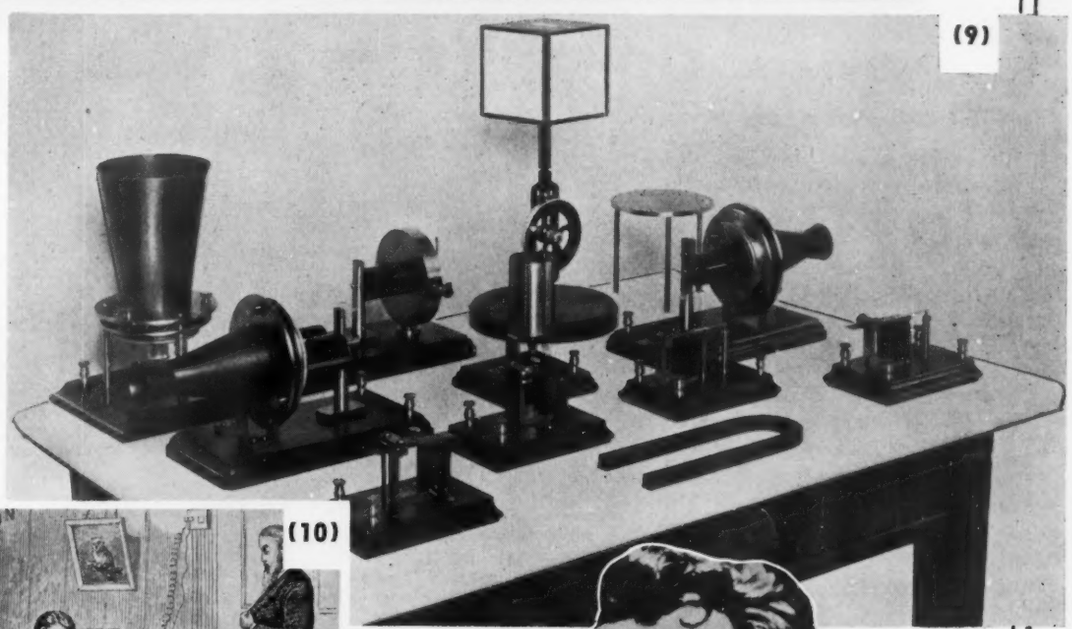
The shout Watson heard and Bell's rush into the room were the result of that recognition and Watson later commented that "*the speaking telephone was born at that moment*" for then "*Bell knew perfectly well that the mechanism that could transmit all the complex vibrations of one sound could do the same for any sound, even that of speech. . . .*"

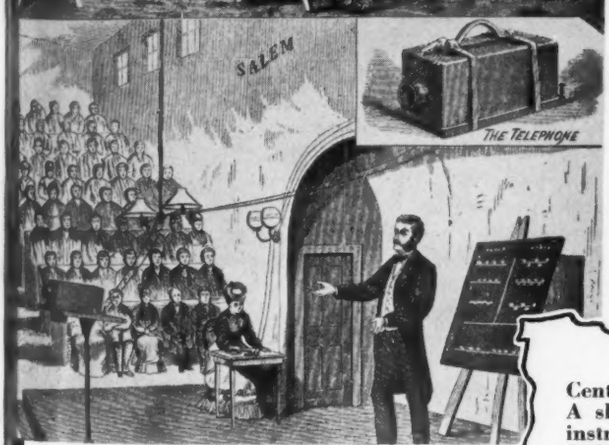
The experiment showed Bell the complex apparatus he had thought would be needed to accomplish his long dreamed result was not at all necessary, for here was an extremely simple mechanism operating in an obvious way that could do the job perfectly. Thus from the all-important date of *June* 2, 1875, all the experimenting was largely a matter of working out details.

At first Bell and Watson spent a few hours verifying details of the discovery, repeating it with all the differently tuned springs they had. Before they parted that night Bell gave Watson instructions for making the first electric speaking telephone.

Watson was to mount a small drumhead of gold beater's skin over one of







In an obscure corner of one of the halls (8) at the Philadelphia Centennial, in 1876, Bell gave the public its first view of the telephone. A sketch of the exhibit is shown in the corner, and replicas of the instrument (9) were made for the telephone's 50th anniversary in 1926. After the Dom Pedro incident, when the Brazilian emperor is said to have exclaimed, "My God, it talks!" greater prominence was given the display . . . Reproduced from a contemporary source is this sketch (10) of Bell giving a lecture demonstration before a Salem, Mass., audience, with speech being transmitted from his laboratory, 14 miles distant . . . Bell, in 1876, the year his telephone was patented (11).

the receivers, join the center of the drumhead to the free end of the receiver spring and arrange a mouthpiece over the drumhead to talk into. Bell's idea was to force the steel spring to follow the vocal vibrations and generate a current of electricity that would vary in intensity as the air varies in density during the utterance of speech sounds. Watson followed these directions and had the instrument ready for trial the next day. He rushed it. Bell's excitement and enthusism over the discovery had aroused Watson's interest which had been seriously dampened during the meagre results of the harmonic telegraph. Watson made every part of that first telephone, not realizing what a tremendously important piece of work he was doing.

The First Telephone Line

THE TWO rooms in the attic were too close for the test as the voices of Bell and Watson would be heard through the air. Watson ran an especially made wire from one of the attic rooms down two flights to the third floor of the Williams' building. That was the first telephone line and its installation started a new series of experiments. Watson shouted loudly but he could not make Bell hear him. Bell talked and Watson heard him and almost caught the words. This caused Watson to rush downstairs to tell Bell what he had heard. Watson's description was enough to show Bell he was on the right track. Before he left that night he gave Watson directions for several improvements in the telephones to be used for the next trial.

Watson Hears The First Sentence Ever Spoken Over The Telephone

IN THEIR struggle to expel the "imps" from the invention an immense amount of experimenting had to be done. But it wasn't many days until Bell and Watson could talk back and forth and hear each other's voice. However, it was not until the following March that Watson heard a complete and intelligible sentence.

Soon after the first telephones were made, Bell rented two rooms on the top floor of an inexpensive boarding house at No. 5 Exeter Place in Boston. He slept in one room and made the other room into a laboratory. Watson ran a wire between the two rooms and after that time practically all of the experimenting was done at the new address. In September, 1875, Bell started writing specifications for his first telephone patent.

Before he filed his patent application on *February* 14, 1876, he endeavored to find a method of putting a stronger undulating current on the line than was possible with magnetic induction. He decided this could be done by causing resistance to a battery current to fluctuate, stronger and weaker, as his transmitter diaphragm vibrated. So he also described in his patent specifications a transmitter in which a short wire was attached directly to the diaphragm. As the diaphragm vibrated, the wire moved up and down in a liquid conductor. When it went deeper, resistance lessened; as it rose again, resistance increased; so that a current through the wire and fluid had to undulate as the sound waves required.

Bell's first telephone patent, from those specifications, was issued *March* 7, 1876 although there was not then in existence a Bell telephone that would talk. In the many attacks made on the patent it was freely admitted that the Bell instruments as they stood at the time of the patent "never yielded an intelligible word," but "so firmly was the inventor impressed with the soundness of his theory that he determined to run the risk of taking out a patent on the process."

If Bell had not been so sure of his theories and had he waited before applying for a patent until he actually perfected an instrument that would operate, Elisha Gray would be known today as the "father of the telephone." On the same day that Bell's application came into the patent office there also arrived a caveat from Elisha Gray of Chicago.

The simultaneous appearance of the Bell application and the Gray caveat in the patent office precipitated a conflict that is still capable of starting long arguments. Bell and his friends claimed priority because they could prove their paper had reached the patent office early in the morning of February 14 and was entered first on the record. The Gray answer to this was that the very fact that Bell's application appeared on the books ahead of Gray's proved Gray's had arrived in the office first.

(*Please turn to page* 50)

"It Is Conceivable . . . In The Future wires will unite different cities; and a man in one part of the country may communicate by word of mouth with another in a distant place," declared Alexander Graham Bell, in 1878. Here is Bell doing just that—speaking over the first New York-Chicago telephone line (12), in 1892.

The Markets For New Capital

Albert W. Kimber
Financial Consultant,
Washington, D. C.

How much profit should an Independent telephone company make? . . . What rate of return should the company earn? . . . How is that rate of return determined? ?

HOW MUCH PROFIT should an independent telephone utility make? What rate of return should the company earn, and how is that rate of return to be determined?

A telephone utility should earn what it needs, and that is the amount of net operating income which will provide for its capital charges and cover them by such margins as will make their payment look well protected. The judge and jury who decide on this point are the holders of the company's securities, and others who could or might buy them. There is no court of appeal.

In the capital markets the telephone utility is always in competition with other companies, not so much other telephone utilities but in these times more especially with the electric utilities. If the telephone utility has bonds or stocks outstanding, investors make comparisons between them and others available for purchase. If the telephone utility comes into the market for new capital, the terms of its new offering and the condition of the company itself are compared with similar offerings of more or less similar companies, as well as with their outstanding securities. The test of quality is the comparative adequacy or inadequacy of the company's net earnings. This is a condition that cannot be evaded; it is inevitable and the decisions based upon it are controlling. Investors will not pay as much for an inferior security as the price they can pay to obtain a security of higher quality.

For the information of the telephone utility itself, the selection of other utilities whose earnings are to be studied for comparison purposes should avoid companies which are so large or so small that their enterprise is not comparable. For example, the earnings and market transactions of Commonwealth Edison of Chicago have no meaning or significance whatever for a telephone utility with total capital of say $3,000,000. This is an extreme of course. The selected companies should preferably operate in territory nearby, say in the same state and adjoining states, and their new capital issues should have been placed in the same markets available to the particular telephone utility. Effort should be made to find securities that would be available for purchase, or have been purchased recently, by the same kind of investors who would be expected to purchase the securities of the particular telephone utility. Usually the natural market for new securities of any small company is among the holders of its bonds and stocks already outstanding, or with other persons like them in the same general part of the country. It is in this market or markets, as they are called, that the smaller telephone utility will encounter the least competition. But if the new security offering is too large for such a market to absorb at one time, it becomes necessary to offer in other markets.

The Rate Base

FOR COMPARISONS with other utilities, decision must be made as to the base against which the rates of return are to be calculated. For more than ten years now most state regulatory commissions have used a property base, most of them taking the value of the property at its original cost, then deducting accrued depreciation. The calculation of original cost is made by the commission itself or at least is subject to its approval, and commissions have no hesitation in striking out items they don't like. If the accrued depreciation does not seem to them large enough they increase it for purposes of the rate base. Some of them permit inclusion of the cost of plant under construction, others do not; some permit inclusion of materials and supplies and working cash, some at arbitrary figures not the actual, some will allow nothing for these items. Some consider cost of reproduction, some rule it out entirely. In summary, rate bases calculated on plant or property are so different in different states, and even so different from one company to another in the same state, that there is no common denominator in plant, and comparisons of earning rates based on plant are sure to contain error if many different companies are used.

The investor does not understand a "rate base" calculated against property values; he is not interested in such a rate base, nor in the percentage of return which the company earns on it; neither is he interested in plant values, book costs less depreciation or otherwise, because the methods by which these are calculated or applied by the commissions are mysterious, to say the least. But there is no mystery about the amount of money which investors have put into a telephone or electric utility, and it is the earnings on that money which interest the investor. In fact almost the first question which any investor asks about a company into which he is invited to put money is, "how much profit are they making on the money they now have?"

The true basis for measurement and comparisons therefore is the capital which has been invested in the respective companies. There can be little or no doubt as to the amount

of this capital at any given time; it is the sum of bonds and other debt, preferred and common stocks and total surplus. This of course is not a rate base, and until recently no state commission would accept it as such, some would not even consider testimony based on it. But an increasing number of them now do, and many court decisions have used it. Once a proper return on invested capital is calculated, the amount of it can be expressed as a percentage or "rate of return" on any rate base, including one based on plant costs.

Calculation of Earnings Need

A ROUGH FORMULA that can be applied to determine a minimum rate of return on invested capital would be as follows. This assumes a company with $1,000,000 total capital issues plus $100,000 surplus.

Amount		Annual Requirement
$ 400,000	bonds at 3.25%	$13,000
200,000	preferred at 5.50%	11,000
400,000	common stock at 16%	64,000
100,000	surplus (Total)	...
$1,100,000		$88,000

The $88,000 shown above is the annual net operating income required to support the indicated capital issues. This amount represents 8.00% per annum on the total invested capital or 8.80% on the capital issues alone, and under present conditions is about right for a company with total invested capital of $1,000,000 or so. Smaller companies may easily need more, and much larger companies can sometimes get along with something less.

But interest and earnings requirements are often affected by the proportions which debt and equities occupy in the capital structure. The capitalization balance represented in the table above is debt 36.3%, preferred 18.2%, common stock and surplus 45.5%. For a small telephone utility, say up to $3,000,000 capitalization total, this balance is about right. If the debt in the table should be increased to $500,000 and the common stock reduced to $300,000, the capitalization balance would be 45%, 18% and 36%, but then the bonds would probably have to pay interest at 3.50% per annum and the common stock would need an earnings rate of 18% instead of 16%. And if a company should let itself run further into debt, and in this table for example should have debt $600,000 and common stock only $200,000, in other words a debt ratio of 54.5%, many analysts would consider it as occupying a precarious position, and purchasers of its common would insist on higher per share earnings because of the greater risk unless there were definite assurance of early correction of the capitalization balance.

In the table above the percentage to be earned on the common stock is 16%, and on the common stock equity (common stock plus the surplus) is 12.80%. The rate of earnings on common stock may be compared with the following:

The record of offerings of common stock by electric utilities in this country east of the Mississippi during the ten months, March-December, 1950, shows that sixteen of them were of stock with par value. The per share earnings for these common stocks during the 12-month period latest preceding the date of offering shows an average earnings of 28.3% on the par value of the shares. Only two of them showed earnings of less than 16% on their par value.

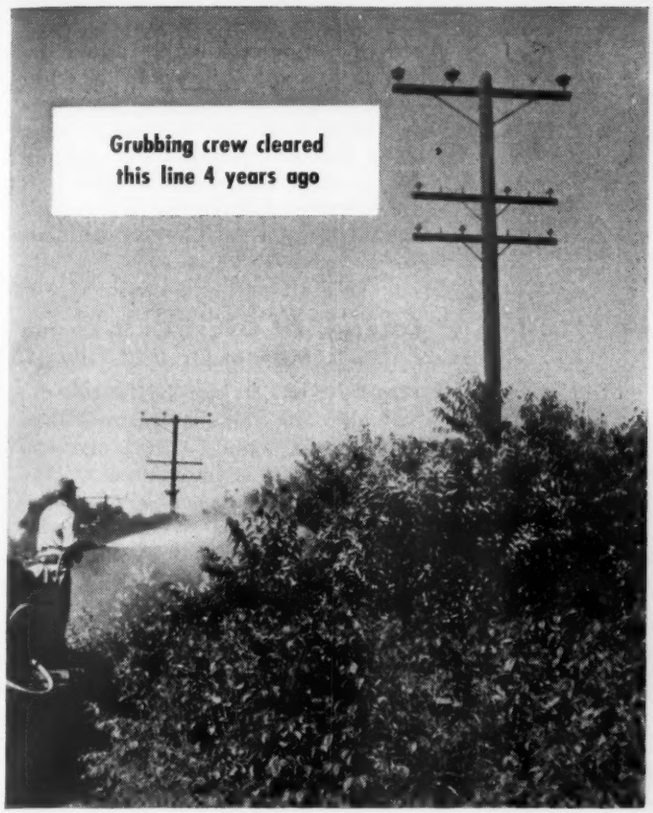
A telephone utility should pay dividends on its common stock of from 10% to 12% per annum on the par value or stated value of that stock; in other words should pay out from 60% to 75% of per share earnings.

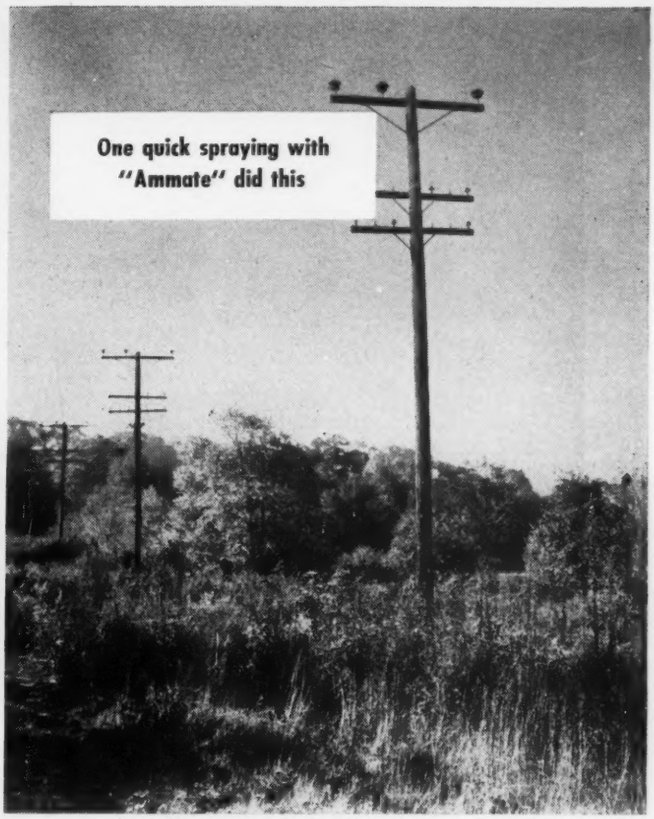
(Please turn to page 70)

Table One—Telephone Company New Capital Issues
December 1950—February 1951

Bonds and Debentures	Amount	Price	Yield %
December 1950			
Middle States Telephone of Illinois 1st 3.25% F 1975	$2,475,000*	101.73	3.16%
Virginia Telephone & Telegraph 1st 3.375% 1974	1,100,000*	101.24	3.30%
La Crosse Telephone (Wisc.) 1st 3.25% D 1975	1,100,000*	100.85	3.20%
January 1951			
Indiana Associated Telephone 1st 3% 1981	1,600,000*	100.00	3.00%
Chillicothe Telephone Ltd. (B. C.) 1st 4% A 1971	200,000	100.00	4.00%
Kootenay Telephone Ltd. (B. C.) 1st 4% A 1971	250,000	100.00	4.00%
Northwest Telephone Co. (B. C.) 1st 4% A 1971	250,000	100.00	4.00%
Central Vermont Telephone 1st 3.50% 1976	165,000*	100.00	3.50%
Enterprise Telephone Co. (Pa.) 3.75% Notes	250,000*	100.00	3.75%
February 1951			
Coachella Valley Telephone (Calif.) 4.25% Note 1968	75,000*	100.00	4.25%
American Telephone & Telegraph Conv. Deb. 3.375% 1963	420,000,000	...	...
Thomaston Telephone (Ga.) 1st 3.50 Serial to 1971	400,000	100.00	3.50%
Bell Telephone of Canada 3.50% 1976	40,000,000	101.25	3.42%
Preferred Stock	**No. of Shares**	**Price**	**Yield**
January 1951			
Southwestern States Telephone $1.25 pfd. $25 par	30,000	$25.00	5.00%
Chilliwack Telephone Ltd. (B. C.) 5% pfd. $10 par	15,000	10.00	5.00%
Kootenay Telephone Ltd. (B. C.) 5% pfd. $10 par	15,000	10.00	5.00%
Northwest Telephone Co. (B. C.) 5% pfd. $10 par	25,000	10.00	5.00%
Central Telephone (Neb.) 5.25% pfd. $50 stated	9,000*		
February 1951			
Union Telephone (Michigan) $2.70 pfd. $50 par	15,000	50.00	5.40%
Common Stock			
December 1950			
Chenango & Unadilla Telephone (N. Y.) Com. $100 par (6.00)	3,000†	100.00	6.00%
Clifton Forge-Waynesboro Telephone (Va.) Com. $20 par (1.20)	9,105	21.50	5.60%
Southeastern Telephone (Fla.) Com. $10 par (0.80)	10,000	11.25	7.11%
La Crosse Telephone (Wis.) Com. $10 par (0.80)	55,500	11.00	7.27%
Westerly Automatic Telephone (R. I.) Com. $25 par (1.50)	7,000†	25.00	6.00%
February 1951			
Kittanning Telephone (Penna.) Com. $25 par (2.00)	6,021†	45.00	4.44%
Harrisonburg Telephone (Va.) Com. $10 par (1.00)	20,000	16.50	6.06%

*Private placing
†Offering to stockholders





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Modern Testing Procedures

By B. C. Burden
Engineer, Lincoln, Nebraska

Part Five of—"A Series of Articles written for the Apprentice Wire Chief and Beginning Troubleman." Part IV was published in the January Fortnightly Telephone Engineer.

BEFORE AN OHMMETER is used for tests on a common battery line, the central office battery must be disconnected from the line under test. This can be accomplished either by disconnecting the jumper on the line side of the main frame or by removal of the heat coils. "Hospital cords" can be contrived which when plugged into a line in trouble will operate the subscriber's line and cut off relay thus removing battery. If a magneto drop is shunted across the hospital cord the troubleman can signal the operator after the trouble is cleared (See *Fig.* 28). The West set or any magneto test set can be used for signalling the operator.

Some dial exchanges are equipped with "line lock-out". This is a feature which automatically removes the battery from the line when a short, ground, or a cross occurs. The battery is automatically restored to the line when the fault is removed. Rural lines or dial systems with this feature can be tested by simply opening the line at the various junctions and branch points and listening with a C. B. test set. If dial tone is heard, this indicates the trouble is beyond the point at which the line has been opened.

In testing dial lines as just described, particularly where the ohmmeter is used, bear in mind that both sides of the line must be open, otherwise the central office ground will be picked up and will give an erroneous test. If dial lines are not equipped with the "line lock-out" feature, the line must be disconnected at the main frame either by removal of heat coils or removal of the jumper. Some main frames automatically ground the incoming line when the heat coils are removed. On frames of this type, dummy (wood or fiber) heat coils can be used.

Location Of Opens On Common Battery, Manual Or Dial Lines

OPENS CAN best be located on dial and manual battery lines by simply listening with a common battery test set at intervals along the line. As long as the central office dial tone (or the operator) can be heard the fault is still ahead of the tester.

Location Of High Resistance Connections With Ohmmeter

THE LOCATION of high resistance splices and test connections in rural open wire lines presents some difficulties. One of the best methods is to take mile-by-mile "short circuit" readings from the office up to the point at which the first subscriber is connected. These metallic "readings to short" on magneto lines will readily detect any excessive resistance in any given section of line.

When a mile is encountered in which a reading is more than 10% above normal, then readings should be taken at quarter, half, and three-quarter mile points in the "high mile" to run down specific bad splices. If the excessive resistance is in a single splice, it is easy to go directly to it. If several bad splices are responsible, then more time will be required to isolate the trouble.

The effect of intermediate subscriber's ringers can be eliminated by inserting a 2 m.f. capacitor in series with one side of the subscriber's drop during the time the tests are in process.

A further method of locating high

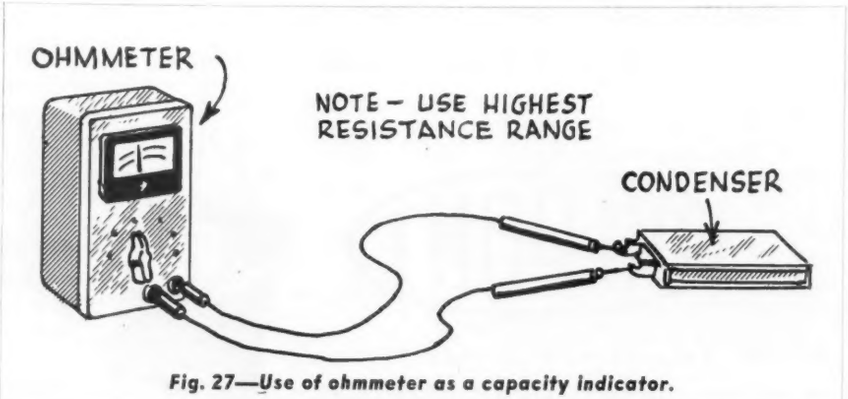


Fig. 27—Use of ohmmeter as a capacity indicator.

resistance connections in line wires is to use three wires (if the third wire is available) and make measurements as shown in *Fig.* 29.

Use Of Ohmmeter In Cable Plant Testing

OLD TIME CABLE splicers claim they can tell the precise condition of a cable pair from the standpoint of leakage between pairs or to ground by means of a simple receiver and battery test. The writer, while acknowledging the skill which these cable splicers can tell which pairs are "leaky" and how "bad," would not agree that the receiver-battery combination is the best possible means for checking leakage on cable pairs. A good high resistance ohmmeter will show pecisely in ohms or megohms the leakage present and will give the same results in the hands of the novice as with the expert.

The telephone receiver is a remarkably sensitive device. It will give an audible click on a few micro-amperes of current, nevertheless it is not an ideal insulation measuring instrument. Furthermore, even experienced troublemen can be fooled by mistaking a capacitance click (due to cable capacitance) for leakage.

Ohmmeter With 50-Megohms Range

OHMMETERS capable of measuring up to 30 or 40 megohms are desirable. The ohmmeter shown in *Fig.* 30 has a maximum range of 50 megohms with a center scale reading of 500,000 ohms. This is a particularly useful meter for both cablemen and open wire troublemen. Its many uses include measuring insulation leakage on cable pairs, measuring loop resistance of pairs, for individual conductor identification, and even for rough checks of cable pair capacitance.

Capacitance tests are often useful in identifying a cable group complement where some pairs extend to greater distances than others. *Table One* illustrates some of these miscellaneous applications in cable pair testing of the Model 372 Simpson Ohmmeter. The high sensitivity of the Model 372 is obtained by use of a micro-ampere basic movement with a full scale deflection of *only* 85 *micro-amperes!*

Use Of Ohmmeter On Subscriber's Sets

THE PORTABLE ohmmeter is a "natural" for quickly locating trouble in L. B. and C. B. telephones. With it the most difficult faults can be located; furthermore, it will often detect potential trouble which the ordinary talking-listening-signalling tests might pass by. The ohmmeter may be used in two ways in telephone testing, viz:

(1)—Line terminal overall tests.

(2)—Individual component tests.

The *line terminal overall test* (see *Fig.* (31) is made on magneto sets by simply connecting the ohmmeter to line terminals L_1 and L_2. One or both of the line wires leading to the outside drop should be disconnected at the set. The ohmmeter range selected should be appropriate to the reading expected. If the test is on a telephone on which there is no trouble and the test is being made for checking purposes only, readings should be obtained as follows:

(1) With the receiver on the hook, the ohmmeter should show the resistance of the ringer (1000, 1600, or 2500 ohms).

(2) Remove the receiver from the hook and note any change in reading. If there is a capacitor in the receiver circuit there should be no change in reading. If there is no "non-ring through" capacitor in the receiver circuit (or if there is one and it is

(*Please turn to page* 74)

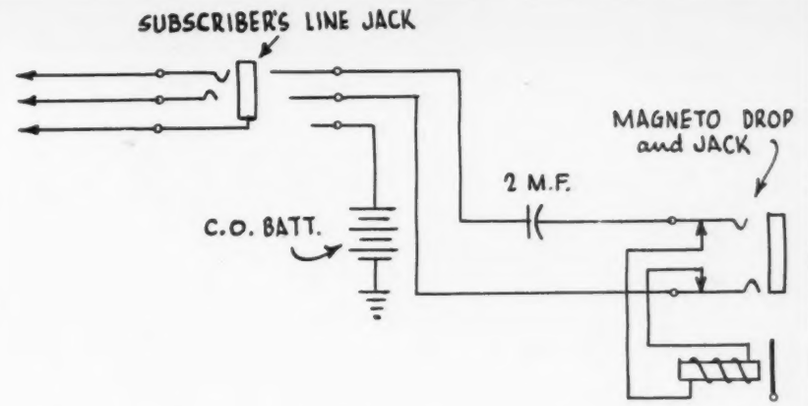
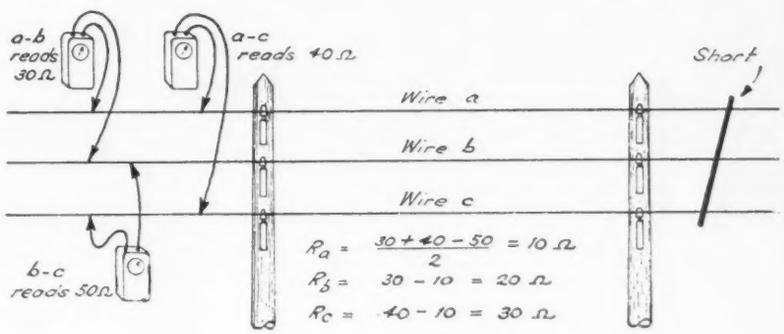


Fig. 28—Improvised hospital cord for common battery boards.



$$R_a = \frac{R_{ab} + R_{ac} - R_{bc}}{2}$$

$$R_b = R_{ab} - R_a$$

$$R_c = R_{ac} - R_a$$

Where: R_a — resistance of wire *a*, R_b — resistance of wire *b* and R_c — resistance of wire c.

Fig. 29—Example of triangular method of obtaining individual wire resistance.

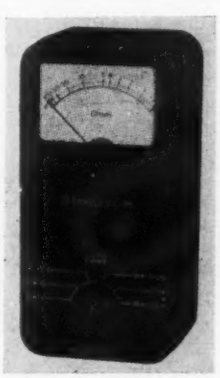
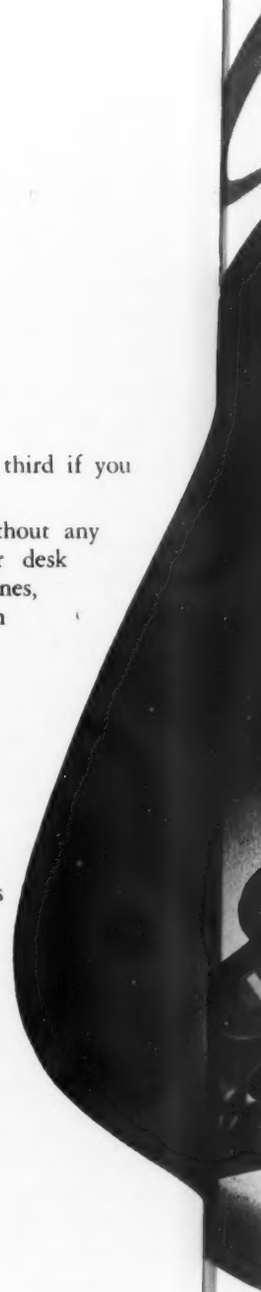


Fig 30—This ohmmeter has maximum range of 50 megohms with center scale reading of 500,000 ohms.



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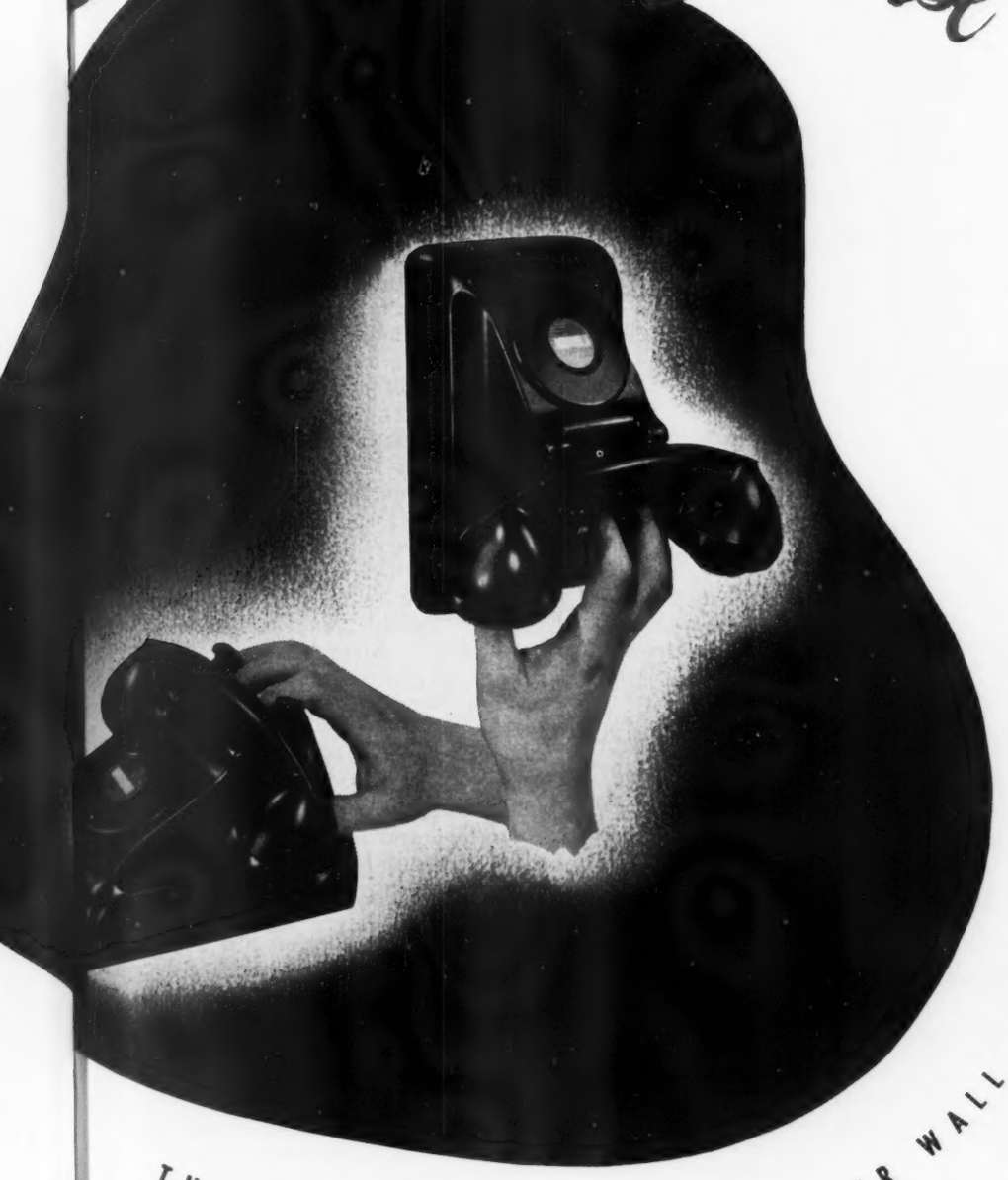

THE LEICH TELEPHONE IS EITHER WALL OR DESK MODEL

Minnesota Commission Approves Rates For REA Financed Cooperative

ONE OF most-asked questions concerning rural telephone development plans of the Rural Electrification Administration (REA) has been —*"What rates will be paid by subscribers?"*

Partial answer to this popular question may be found in *Order M-3267*, issued Feb. 13 by *Minnesota Railroad & Warehouse Commission*, establishing a new rate structure for *Gardonville Cooperative Telephone Association, Brandon, Minn.* The Gardonville co-op recently received $321,000 loan allocation from REA.

On Jan. 3, the Gardonville co-op appeared before the Minnesota commission to support its application for authority to change its schedule of rates and charges at its Garfield, Brandon and Evansville, Minn., exchanges. Company officials testified that in 1947 the co-op had proposed to convert all its exchanges to dial operation, but due to rising costs of material and labor and lack of the necessary finances, only the Garfield exchange was completed. They stated the REA loan allocation would be used to complete the work.

After reviewing testimony, the Minnesota commission ordered: (1) Gardonville Cooperative Telephone Association is permitted to place in effect at its Brandon and Evansville exchanges the rates and charges for Magneto and optional Common Battery service as applied for, rates to become effective on the first billing date following February 28, 1951, (2) Gardonville Cooperative Telephone Association be permitted to place in effect at its Brandon, Garfield and Evansville exchanges the proposed rates and charges for dial telephone service as applied for, rates to become effective upon the first billing date following certification to the commission by a qualified officer of the company that complete dial service is in operation at said exchanges.

Present rates and approved rates are given in *Table One.*

After conversion to dial operation at Brandon and Evansville, the original cost of the property used and useful in rendering service at the Brandon, Garfield and Evansville exchanges will be approximately $195,400.

The Income Statement shows in Column II Operating Revenues, Operating Expenses, Taxes and Net Income under present rates and manual service at Brandonville and Evansville; Column III is an estimate of the Operating Revenues, Operating Expenses, Taxes and Net Income under the proposed rates and manual operation at Brandonville and Evansville; Column IV is an estimate of the same items under complete dial operation shown in *Table II.*

Prior to filing its application for increased rates the Gardonville Telephone Association advised its subscribers that—"After consultations with competent auditors, telephone engineers and other individuals of long experience, your Board of Directors and Officers are convinced that in order to amortize the loan, pay the interest annually, properly compensate our employees for their service, pay all operating and maintenance costs, and provide for depreciation"—rate revisions for the various classification of services would be necessary. In a letter to subscribers, the company stated: "In order that you may realize the necessity for such increases in rates we call your attention to the following comparison (*See Table III*) between 1940 and 1950 prices on just a few of the items, and this is typical of the advances that have occurred in the costs of all materials, supplies and equipment used in the maintenance and construction of telephone facilities.

"The price of poles has increased over 400% during the past decade.

"You are all aware of the increased costs of labor and transportation, all of which affect the construction,

TABLE ONE

Class of Service	Present Magneto Rates	New Magneto Rates	Present Dial Rates	New Dial Rates	Old Common Battery Rates	New Battery Rates**
Business—						
1-Party	$3.25 (a) *	$4.75 (a)	$4.00 (a)	$5.25 (b)	—	$5.00 (b)
2-Party	2.75 (a) *	4.25 (a)	3.25 (a)	4.75 (b)	—	4.50 (b)
Rural Multi-Party, Metallic	—	3.75 (a)	—	4.25 (b)	—	—
Extension Station	1.00 Net	1.00 Net	1.00 Net	1.25 Net	—	1.00 Net
Residence—						
1-Party	$2.00 (a) *	$3.25 (a)	$2.50 (a)	$3.75 (b)	—	$3.50 (b)
2-Party	1.75 (a) *	2.75 (a)	2.00 (a)	3.25 (b)	—	3.00 (b)
4-party	—	2.50 (a)	1.75 (a)	3.00 (b)	—	—
Rural Multi-Party, Metallic	2.00 (a) *	3.25 (a)	2.50 (a)	3.75 (b)	—	—
Rural Multi-Party, Grounded	2.00 (a) *	2.00 (a)	—	—	—	—
Extension Station	.50 Net	.75 Net	.75 Net	1.00 Net	—	.75 Net
Employee Station	1.00 Net	2.00 Net	1.50 Net	2.00 Net	—	—
Charitable & Elecmosynary Organizations	2.00 (a)	2.50 (a)	2.50 (a)	3.00 (b)	—	2.75 (b)
Rural School Stations	10.00 Net Yr.	18.00 Net Yr.	15.00 Net Yr.	21.00 Net Yr.	—	—

New Approved Mileage Charges: Each one-eighth mile or fraction thereof beyond the local base rate area, 1-party $.30 per mo. net; 2-party, $.20 per mo. net, each subscriber; 4-party, $.15 per mo. net, each subscriber.

New, Approved Service Connection Charges (Net)	Business	Residence	Extension
Instrument not in place (local)	$3.00	$2.00	$1.00
Instrument in place (local)	2.00	1.50	1.00
Instrument not in place (rural)	3.00	3.00	2.00
Instrument in place (rural)	2.00	1.50	1.00
Inside Moves:			
Main Station	1.50	1.50	
Extension Station	1.50	1.50	
Change in Type of Equipment:			
Main Station	1.50	1.50	
Extension Station	1.50	1.50	
Reconnect Charge (where instrument has been disconnected for nonpayment)	2.00	2.00	

Extension of present facilities for telephone service will be made by the company where such extension will not exceed five poles. On extension beyond five poles charge for labor and materials will be made by mutual agreement.

*—An additional charge of 25 cents per month for handsets.

(a) A discount of 25 cents to be allowed on all gross rates if payment is made on or before the 25th day of the month in which service is rendered.

**—Common Battery—Optional.

(b) All rates are to be billed monthly in advance and a discount of 25 cents is to be allowed on all gross rates if payment is made on or before the 25th day of the month in which service is rendered.

TABLE TWO

I	II	III	IV
Maintenance	$ 6,029	$ 6,688	$ 6,688
Operating Revenues	$ 23,483	$ 33,737	$ 38,007
Operating Expenses			
Traffic	4,071	6,688	831
General	5,483	5,705	5,705
Depreciation	5,768	5,768	9,533
Taxes	1,220	2,608	4,356
Uncollectibles	117	169	190
Total Expenses	$ 22,683	$ 28,688	$ 27,313
Net Income	$ 800	$ 5,049	$ 10,694

TABLE THREE

	1940	1949
"Magneto Telephones	$20.15 ea.	$33.00 ea.
"Iron Wire	4.83per Cwt.	11.85 per Cwt.
"Oak Brackets	42.50 per 1,000	72.00 per 1,000
"Cross Arms	1.0921 ea.	2.54 ea.
"Dry Batteries	25.00 per 100	47.00 per 100

maintenance and operation of your telephone company.

"The philosophy of the Rural Electrification Administration on its telephone program, regarding modernization of plant and need for adequate rates to support it, was outlined by REA Administrator Claude R. Wickard in an address before the Indiana Farm Bureau Convention Thursday, Nov. 16:

" '*One of the things you must realize before you start is that a modern telephone service is going to cost more than* $1.50 *a month*', *Mr. Wickard commented. 'Especially is this true if you are going to maintain good service, and I want to say on behalf of REA, which is charged by the Congress with the responsibility of getting these rural telephone loans repaid to the government, that we are not interested in the installation of any facilities which will not give good service throughout the loan period.*

" '*I consider uncertain or poor service as constituting a poor risk, because when people are not satisfied with the service they are going to discontinue it. Unsatisfactory service results in reduced revenues and thereby jeopardizes a borrower's ability to repay the government loan*'.

"We reiterate that the obligations of the indenture and our contract with the Government for advancement of the financial requirements necessitate the rates above . . ."

Benckert Heads REA Telephone Engineers

APPOINTMENT of K. Woodrow Benckert as head of the Telephone Section of the Rural Electrification Administration's (REA) Engineering Division was announced Feb. 21. Mr. Benckert will work under R. W. Lynn, assistant chief of the division in charge of the telephone program. Mr. Lynn will continue to be responsible for the broad field of telephone engineering, and Mr. Benckert will administer local engineering activities in connection with specific loan applications.

Mr. Benckert has had wide experience in the telephone engineering field since 1929 on all phases of inside and outside plant design and construction. He served in the Navy during World War II as a specialist on communications and electronic equipment.

New Co-op Planned At Dodge City, Kans.

PLANS FOR formal organization of a rural telephone cooperative in Victory Electric Cooperative territory are under way, Roy Marler, Victory manager at Dodge City, Kans., has announced.

Marler said legal documents for creation of the co-op have been received from Washington, D. C.

Preliminary organization work is being done under auspices of the Farm Bureau and leading farmers of the area.

Much of the field work, such as signing of applications and mapping of existing telephone lines in the rural sections has been completed.

Frank Horton & Co., Lamar, Mo., engineering firm, is preparing final maps and designs of the new system.

Victory REA has plans to give automatic service to all rural homes in the territory, Marler announced.

Victory Electric serves farms in an area comprising large sections of six counties in the Dodge City vicinity.

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Type 47 Voice Frequency Repea

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The Type 47 Repeater gives transmission the *extra* volume needed on long lines. Its engineered "balancing network" adjusts easily to precisely match the repeater to your line; this accurate matching gives maximum gain. And the Type 47 Repeater needs very little attention, because its stable balance assures consistent operation.

Encourage toll traffic with Type 47 Repeaters. Compared to stringing new wire, they give you the same improvement at a fraction of the cost. Ask your Automatic Electric representative for a copy of Circular 1692-A, or write

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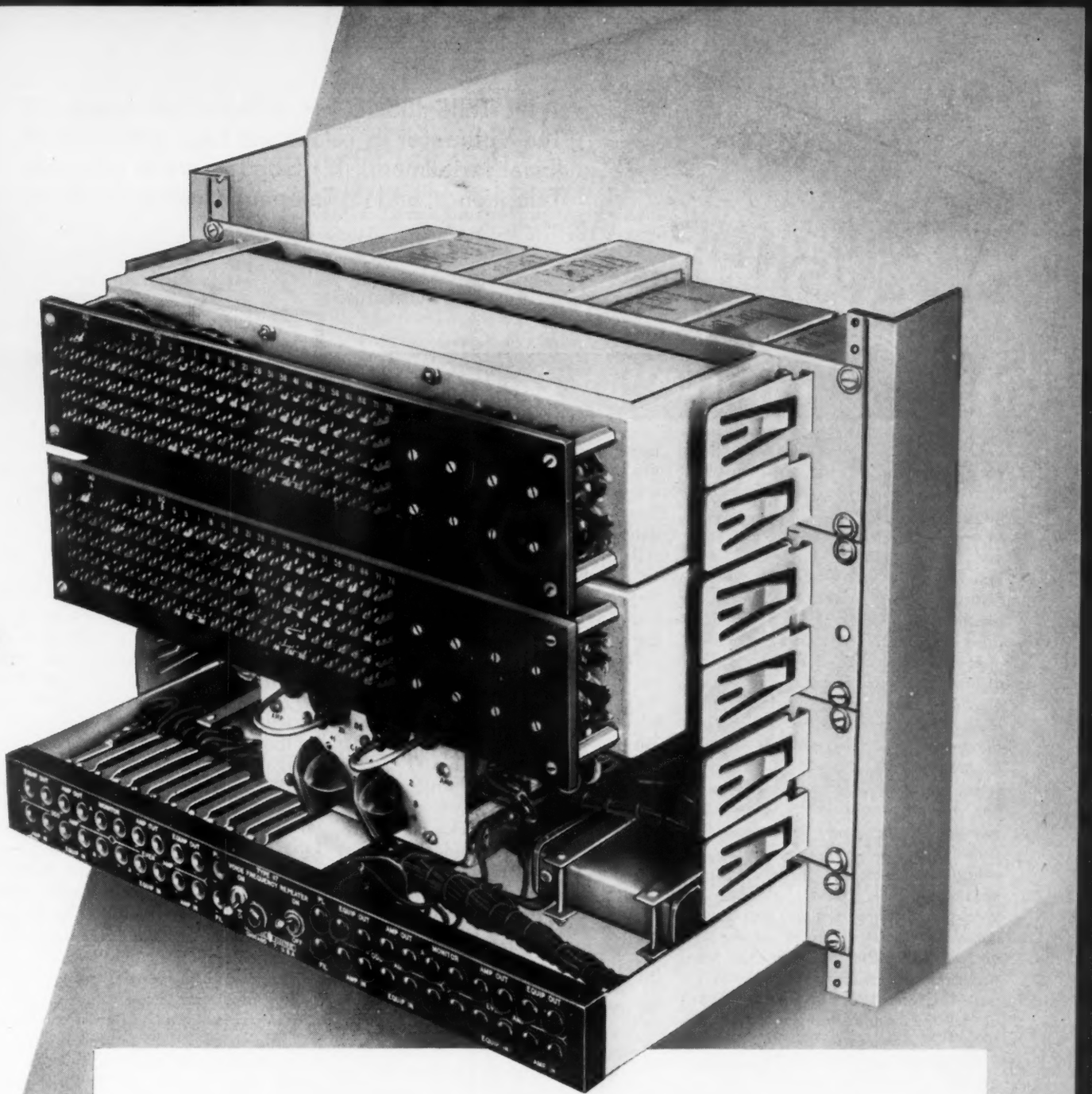

Unit Construction

Components can be selected for 2-wire or 4-wire circuits, for intermediate or terminal operation (intermediate, 2-wire repeater shown above). Compact assemblies mount in minimum vertical space on 19" rack. Individual units can be quickly isolated for routine tests and maintenance.

High Volume Boost

Higher-than-ordinary amplifier gain gives maximum volume because choice of 61 line balancing units permits precise impedance matching. Choice of three low-pass filters—3500, 2850, 2450 cps—for various circuits, eliminates "singing," permits use of highest gain.

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In case of power or tube failure, the line remains operative. Relays automatically cut the repeater out of the line without disrupting transmission; these relays can also be wired to provide an alarm. Normal operation resumes automatically when power is restored or tube is replaced.

QUESTIONS and ANSWERS

IN THIS ISSUE Mr. Mitchell discusses, (1) The Voltmeter in Telephone Line Maintenance (Final Installment), (2) Condensers in Magneto Telephones, and (3) Telephone Instruction Book.

PROBLEM: SOLUTION:

By Jay G. Mitchell

QUESTION:—I have been reading your QUESTION AND ANSWER DEPARTMENT *for quite a long time now and have never had the occasion to use its help till now. Our company has installed new North All Relay systems in some of our smaller exchanges. These North units have an arrangement whereby one can test lines that are in trouble.*

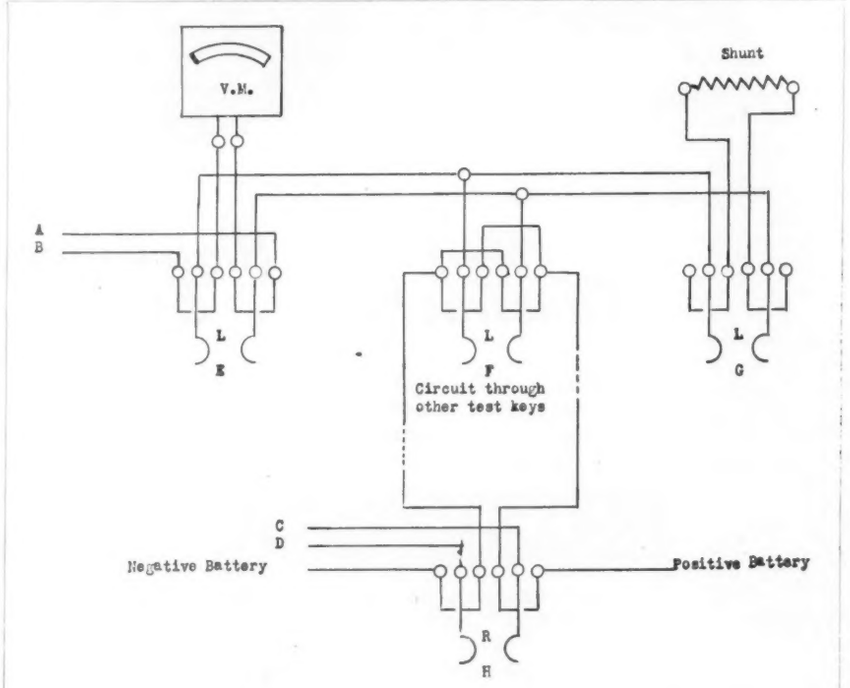
My problem is this. I wish to place a shunt in the voltmeter circuit so that anyone testing on a line may read the voltmeter and tell how far away the trouble is. The voltmeter is calibrated from 0 to 80 volts, in two volt steps, and is a Triplett meter. How is one able to arrive at the proper resistance of the shunt to be used? I would like also to know how one would arrive at the proper readings on the voltmeter with the shunt key thrown. Each two volt step would equal so much resistance on the line on test. The battery is furnished from the exchange battery of 50 volts. I have the same thing on our test board at one of our exchanges. The testboard is Automatic Electric Testing Turrett. It has a Weston voltmeter, Model No. 269, and is calibrated from 0 to 75 volts in one volt steps. I hope I have explained my problem enough for you to give me an answer. Thank you.

ANSWER:—This inquiry is again repeated in full because it required more space to answer it than can be assigned to the QUESTION AND ANSWER column in any one issue. In four prior installments the relation of the voltmeter to the circuit to be tested, the method of computing the resistance of the external loop, the procedure involved in the design of the voltmeter shunt and typical curves for the external loop resistance with and without the voltmeter shunt for both 10,000 ohm and 100.000 ohm voltmeters have been explained. In this, the final installment of the answer to this interesting inquiry, the use of the voltmeter in the approximate location of another type of maintenance trouble will be described, together with the arrangements of the testing equipment for routine use in the telephone office.

In the figure there is shown the relation of the voltmeter to the other testing equipment. It will be noted that four half keys are shown with the voltmeter.

These keys are designated, for reference, as "E", "F", "G", and "H". Keys which remain in the position given them, that is which do not return to a normal position, are further designated by the letter "L". The one key in the figure which returns to its normal position when the pressure on its cam is released is "H" and keys of this mechanical type may be indicated, as key "H" is in the figure, by the letter "R".

Referring to the figure it will be noted that key "E" which is non restoring when the pressure on its cam is released disconnects both the tip and ring of the testing cord from the voltmeter and connects the testing cord instead to terminals "A" and "B". These terminals should be provided in any testing equipment so that such instrumentalities as a Wheatstone Bridge, a special High Impedance Voltmeter or special relay equipment can be readily connected to the test cord. Key "F", it will be noted, reverses the terminals of the voltmeter when keys "E", "G" and "H" are normal and is required in the identification of foreign voltage. Key "G" disconnects the voltmeter shunt. It should be stated that the shunt is to be normally kept in parallel with the voltmeter in order to prevent damage to that instrument from violent movement of the pointer



Relation of voltmeter to testing circuits

when unexpectedly connected to unusually high voltage. In other words the routine testing in the telephone office should be done with the *voltmeter shunted.*

Key "H" is of the type which returns to normal when the pressure on its cam is released. It will be seen that when keys "E", "F", and "G" are normal the operation of key "H" will connect the battery to the tip "C" and ring "D" of the test cord. When key "H" is released, with the other keys in normal position, the electrical charge of the conductors to which the test cord has been attached will be discharged through the voltmeter. The throw of the voltmeter pointer in that case will be proportional to the electrical charge that was given to the circuit under test by the operation of "H". This is important in determining the approximate location of a clear open circuit, such as a blown fuse in a cable terminal. It also, after a little practice, affords a method by which the trouble clerk may supplement the indications required to diagnose the condition of a given circuit. Because of the variations in the capacitance of telephone circuits due to the varying lengths and characters of telephone cable and to the fact that different telephone circuits may be serving many different numbers of telephone stations each it is not possible to compile a tabulation of the circuit capacitances as was possible in the *resistance* of external loops. However the alert trouble clerk soon acquires a working knowledge of his plant which enables him to make use of the charge and discharge method of testing clear open circuits and, in many cases, for illustration, to check the number of common battery telephone stations connected to a given line. With the use of an adjustable standard condenser the throw of the voltmeter pointer for various values of line capacitance in microfarads for any given testing circuit arrangement may be tabulated with close approximation of accuracy. In addition to the three locking keys and the one release key shown in the figure which are associated with the voltmeter the test equipment will require two full keys (release both ways) and four half keys (release) for *each test cord circuit.* This will make it possible to make the following checks:

Exchange Battery Voltage
Insulation (tip)
Insulation (ring)
Foreign voltage
Metallic insulation (tip and ring)
Ring out on tip
Ring out on ring (also metallic)

QUESTION: I read your QUESTION AND ANSWER *column and the entire magazine. I find your articles very beneficial. I work with magneto telephones and would like to know if by placing a condenser in series with the ringer circuit a clear line for testing would be obtained. Also if this were done would a condenser be required at each station? If so what value condenser should be used. Would this impair the normal service in any way? I am rather new in this service and would appreciate your reply. Enclosed is a directed and stamped envelope.*

ANSWER: The insertion of a condenser in the *ringer circuits* of all the telephones connected to the circuit under test would afford a clear circuit for direct current testing *except that the removal of any telephone receiver from its support would interfere with the test.* To eliminate this possibility the installation of "ring by" condensers in the *receiver circuits* of all telephones connected to the same circuit would be necessary. However there are many methods of testing telephone circuits and many tests can be made, provided suitable testing equipment is available, without condensers in each telephone connected to a party line.

When a condenser is connected into the *ringer* circuit of the telephone instrument it should be of the nominal capacity of 2 mfd. Such a condenser will have an impedance to 20 c.p.s. ringing current of approximately 4,000 ohms. At 1,000 c.p.s. such a condenser will have an impedance of approximately 80 ohms. The insertion of such a condenser into the telephone circuit will not be a seriously destructive factor to either ringing or telephone transmission.

The insertion of a "ring by" condenser in the *receiver* circuit will make it possible to ring out on a party line although some receiver may be off its support. Such condensers are nominally 0.5 mfd. and have an impedance at 1,000 c.p.s. of approximately 300 ohms which will produce a noticeable effect on telephonic transmission but which is usually deemed not to be seriously objectionable.

If this does not cover the inquiry please write in again.

QUESTION:—Can you advise me where I could purchase a very simplified instruction sheet, book or pamphlet on means of testing, servicing and repairing of both magneto and common battery telephones?

I have purchased a number of pub-

(*Please turn to page* 72)

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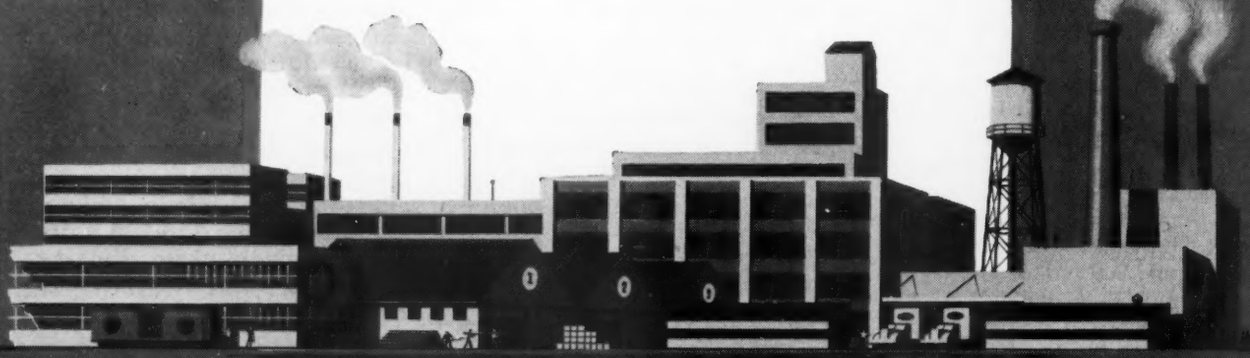
They remember how one man's dream grew to a service covering this country and most of the world. And they know how it was done—by the hard work of many people, by constant research, by farsighted management—which combined to earn and keep the good will of the public.

Today, nothing is more important to America than defense—and nothing is more important to defense than good communications. That makes the message on the opposite page especially timely. It appears in March national magazines.



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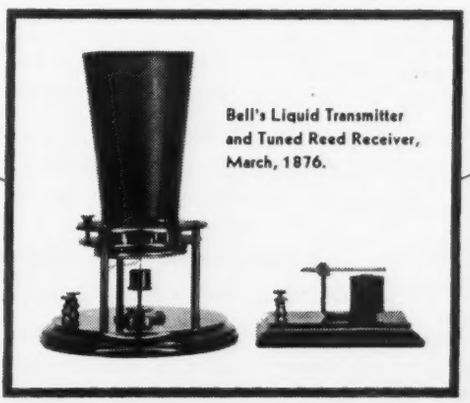

Bell's Liquid Transmitter and Tuned Reed Receiver, March, 1876.

Suppose the telephone had never been invented

Have you ever thought what the world and your life would be like without the telephone?

If you wanted to talk to relatives or friends – if you wanted to order from a store – if you needed to summon a doctor or a policeman in an emergency – there would be no way you could do it in a hurry. What now takes only a few seconds or a few minutes would often take hours and cost you far more than a telephone call.

Each year the telephone becomes more useful to the people and more vital to the prosperity and security of the Nation. Today's tremendous job of production and defense could not be carried on without it.

There are twice as many Bell telephones as there were only ten years ago. They are here and ready because the Bell System kept right on building and improving to meet the country's needs.

Never in the history of the telephone has it been so valuable to so many people as right now.

BELL TELEPHONE SYSTEM

75 Years of Service

(*Continued from page 34*)

The Gray backers claimed applications and caveats were speared on a spindle when they were received and this system left the papers arriving first nearest the bottom of the spindle. They claimed the Patent Office, when entering papers on the record, necessarily entered papers nearest the top of the spindle first so the first paper to be speared on the spindle would appear last on the record.

The controversy on this point went on for years, in and out of court, but the courts invariably held in favor of Bell and Gray was never able to convince the courts of his claims.

Although Bell did not have a talking telephone when he filed his application or when he received his patent on March 7, 1876, three days after receipt of his patent the telephone carried its first intelligible sentence.

On that evening, *March* 10, 1876, Bell and Watson were about to try out the new liquid transmitter. Watson went to the other end of the line in Bell's bedroom and put the receiving telephone to his ear. Almost at once he was astonished to hear Bell's voice saying, "*Mr. Watson, come here, I want you!*"

Mr. Watson rushed down the hall into Bell's room shouting, "*Mr. Bell, I heard every word you said—distinctly!*"

Then and then only did the "imps" that had been bothering Bell and Watson vanish. They went with such rapidity that Bell, in his joy at the success of the new transmitter, forgot he had upset battery acid on his clothing.

From that date on perfection of the telephone began to move more rapidly. Soon the telephone was talking so well Bell was able to exhibit both magnetic and variable resistance telephones at the Philadelphia Centennial Exposition. Watson constructed a telephone of each form devised up to that time. These were the first nicely finished instruments made. "You could see your face in them," Watson later wrote.

The aristocratic telephones worked fine, in spite of their glitter, when Sir William Thompson (Lord Kelvin) tried them at Philadelphia that summer and said, "*I need hardly say I was astonished and delighted and so were the others who witnessed the experiment and verified with their own ears the electric transmission of speech. This, perhaps the greatest marvel hitherto achieved by electric telegraph, has been obtained by appliances of quite a homespun and rudimentary character.*"

On Sunday, June 25, 1876, a group of exhibit judges were about to give up for the day, when one of the judges, Emperor Dom Pedro of Brazil recognized Bell. Dom Pedro had already arranged to introduce Bell's methods in schools for the deaf in Brazil. Now he insisted the judges consider Bell's exhibit, and he was the first to listen at one of the receivers. It is recorded he exclaimed, "*My God! It talks.*"

After the Centennial Exposition there followed a period of hard and continuous work on the telephone. Watson made telephones with every modification and combination of their essential parts he or Bell could think of. They tested telephones with all sizes of diaphragms made of all kinds of materials—diaphragms of boiler iron several feet in diameter, down to a miniature affair made of the

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bones and drums of a human ear—and found best results came from an iron diaphragm of about the same size and thickness as is used today. They tested electro magnets and permanent magnets of a multitude of sizes and shapes, with long cores and short cores, fat cores and thin cores, solid cores and cores of wire with coils of many sizes, shapes and resistances, and mouthpieces of an infinite variety. And out of the hundreds of experiments there emerged practically the same telephone you use today although it was then transmitter as well as receiver.

Talking From Boston To Cambridge, Mass.

BELL AND WATSON made rapid progress and on *October* 9, 1876 they were ready to take the baby outdoors for the first time. They obtained permission from the Walworth Manufacturing Co. to use its private wire running from Boston to Cambridge. The line was about two miles long.

Watson went to Cambridge with one of the best Bell telephones and waited until Bell signalled from the Boston office on the Morse sounder. When he received the signal Watson cut out the sounder, connected in the telephone and listened. Not a murmur came through. Watson immediately asked himself—"Could it be that although the thing worked alright in the house it wouldn't work under practical line conditions?" He knew they were using the most complex and delicate electric current ever employed for a practical purpose and that it was extremely intense for Bell had talked through a circuit composed of 20 or 30 humans joined hand to hand.

Working feverishly, Watson checked over the instrument, adjusting it and tightening the wires in the binding posts without improving matters in the least. Then he realized that perhaps there was another Morse sounder in some other room. Tracing down the wires he found a relay with a high resistance coil in the circuit. This he cut out with a piece of wire across the binding posts and rushed back to his telephone and listened.

He had found the trouble and Bell's "*Ahoy-ahoy*," came clearly over the wire and the first long distance telephone conversation began.

Skeptics had been objecting that the telephone could never compete with the telegraph as its message would not be accurate. For this reason Bell had arranged to make a record of all that was said and heard that night. The plan was carried out and the entire conversation was published in the next morning's *Boston Advertiser* as the latest startling scientific achievement.

Tests on longer telegraph lines followed. Watson later reported that the "success of each experiment was in rather exact accordance with the condition of the poor rusty-jointed wires we had to use."

Fame Of The Talking Telephone Spreads Around The World

MEANWHILE, fame of the invention spread rapidly abroad and many people made pilgrimages to Bell's laboratory to hear the telephone talk. One day Mr. Hubbard received a letter from a man who wrote that he could put Bell and his backers on trail of a secret that would enable them to talk any distance without a wire. This interested Hubbard and he made an appointment for the man to meet Watson.

At the appointed time, a stout rather unkempt man made his appearance. He wasn't interested in the telephone. It was already a back number to him. He told Watson that if Bell would hire him for a small sum per week, Bell would soon learn to telephone without any apparatus or wires. After making this offer the

(*Please turn to page* 52)

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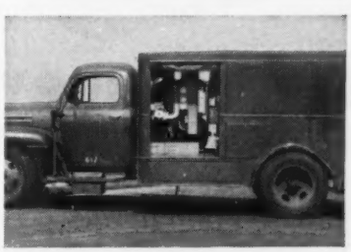

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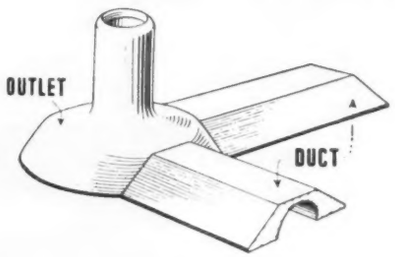

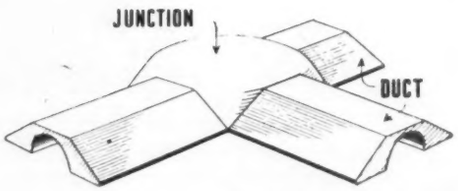

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stranger told Watson how two prominent theatrical men in New York, whom he had never seen, had connected his brain into their circuit so they could talk with him at any time, day or night, and make all sorts of fiendish suggestions to him.

The gentleman was not sure how the producers did it but he was sure the secret would be discovered if Watson would only take the top off his head and examine his brain. Watson later heard that the stout, unkempt man with the wild idea was in the violent ward of an insane asylum.

Of course there were the skeptics and the bearers of wild ideas but mainly the names of those who came to the attic of that cheap boarding house would read like the roster of the American Association for the Advancement of Science.

Finally Bell began to receive requests for telephone installations. In *April*, 1877, the first outdoor telephone line was run between Mr. William's office at 109 Court Street and his house in Somerville. On *May* 17, 1877, telephone lines were first interconnected by means of an experimental switchboard at 342 Washington Street, Boston. On *July* 9, 1877, the Bell Telephone Co. with Gardiner G. Hubbard as trustee, was organized and on *August* 1, 1877 the company's first stock issue—5,000 shares—divided interest in the business between seven original stockholders, A. G. Bell, Mrs. Bell, G. G. Hubbard, Mrs. Hubbard, C. E. Hubbard, Thomas Sanders and Thomas A. Watson.

On *January* 28, 1878, the first commercial telephone exchange was put in operation at New Haven, Conn., serving eight lines and 21 telephones. In that same year, Bell wrote—"It is conceivable that cables of telephone wires could be laid underground, or suspended overhead, communicating by branch wires with private dwellings, country houses, shops, manufactories, etc., uniting them through the main cable with a central office where the wires could be connected as desired establishing direct communication between any two places in the city. Such a plan as this, though impracticable at the present moment, will, I firmly believe, be the outcome of the introduction of the telephone to the public. Not only so, but I believe in the future, wires will unite the head offices of the telephone company in different cities, and a man in one part of the country may communicate by word of mouth with another in a distant place."

Bell's prophecy has long since been realized. The years have proved that more than any other, the telephone

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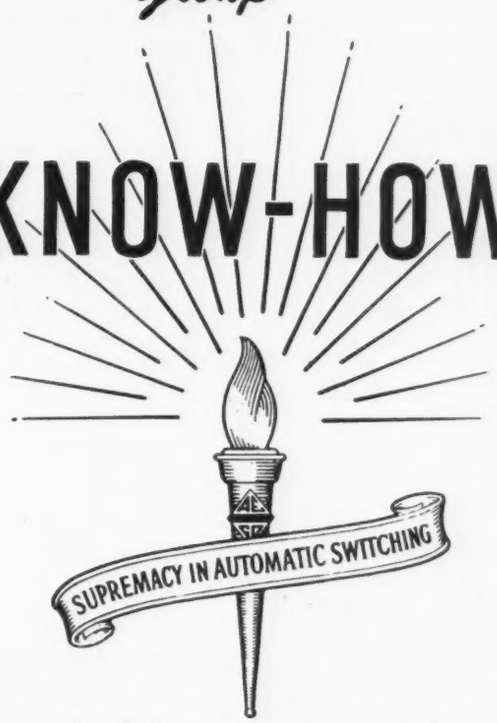

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art is a product of American institutions and reflects the genius of our people. The story of its development is a story of American Free Enterprise and American progress and the true story of that development deals with the progress of two groups—the Bell System and the Independent telephone industry.

Early Day Competition

AT THE END of 1892 there were about 10,000 telephone employees and almost 260,000 telephones in the United States. A large proportion of the telephones in service were business telephones. The invention of Bell had won recognition as a valuable adjunct to the doing of the world's business but it had not gone far toward winning like recognition as a social instrument. America had not yet become a nation of home telephones: the majority of the telephones were in the homes of the wealthy or the comparatively well-to-do. The Bell companies had established their exchanges and leased their telephones in all of the large cities but they had skipped the rural districts which needed and wanted the telephone. It is to the credit of the Independent telephone industry that its pioneers started their exchanges amidst the farms and in the villages and pushed their lines forward and into the cities, meeting the telephone needs of the individual as well as business.

Independent companies were in operation before the basic patent on the telephone transmitter, issued to Bell in 1876, expired in 1893 and his receiver patent, issued in 1877, expired in 1894. There are records of Independent telephone companies operating in 1889 but when competition began in 1894 there was literally not a farmhouse in the country connected with a telephone exchange.

Early in 1894 the Bell Companies were serving some 285,000 subscribers, principally in Eastern cities. In the same year, the Independent movement had progressed so rapidly there were Independent exchanges in operation or under construction to serve 116 cities and towns in widely scattered parts of the country. By 1897 the Independents were well on their way toward their goal of making the telephone available quickly to those who needed it in the small towns, villages and farming districts.

Competition between Bell and Independents was furious. In many instances the companies raced to be the first to establish service. There was constant hostility and even actual physical warfare. Rate slashing became the order of the day. But through it all the public became telephone conscious and during the first two decades after the entrance of the Independents in the field, the industry developed at a fast pace. By 1908 the number of telephones in service had grown to 6,483,600; Bell and Independent exchanges were competing with each other in about 1,000 places; in 600 locations Independent companies were competing with each other.

It soon became obvious that such competition was neither efficient, economical, or satisfactory. There were useless duplications of existing equipment, inconveniences for the subscribers. As long distance telephony advanced with Bell owning the major part of the toll lines, the public and the Independents made demands for more complete interconnection between the companies without regard to ownership.

In January, 1912, Theodore N. Vail, then president of the American Telephone & Telegraph Co. issued a statement of Bell System policies with respect to Independent companies. These policies permitted, under certain conditions, the connection of Bell toll lines with non-competing Independent exchanges. But little

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progress was made in bringing about actual Bell toll line connections with Independent companies until December, 1913. On that date AT&T made the famous "Kingsbury Commitment" with the attorney general of the United States.

This act by the Bell System was a milestone in the history of the telephone industry. It assured the Attorney General that the Bell System would divest itself of its control of Western Union, would connect its toll lines, under certain conditions with Independent exchanges, and would refrain from acquiring competing Independent properties if the United States Department of Justice or the Interstate Commerce Commission objected to such acquisition.

The Kingsbury Commitment did not provide a solution to all the difficulties between Bell and Independent companies but it did start an era of cooperation between Bell companies and Independent companies that has enabled the United States to enjoy the finest telephone service in the world.

Independent Manufacturers Aid Telephone's Growth

IN THE Independent telephone industry a mass of patient research and invention was required to get the industry started in 1893 and 1894. Independent manufacturers were confronted with the task of producing telephone apparatus that did not infringe on the many patents acquired by the Bell during its period of patent monopoly. Those early day companies carried the burden of developing and manufacturing telephones and switchboard equipment that would operate as efficiently as Bell equipment and be made available at a cost that would enable the Independent operating companies to operate at low competitive rates.

The lot of the early-day Independent telephone manufacturer was beset with many troubles. For some it became a period of constant court appearances; for all it became a period of patient research. However, the manufacturers did their work well and originated many notable improvements in telephone equipment for Independent operating companies.

The list of successes is long. Independent telephone manufacturers were responsible for harmonic automatic ringing, convertible switchboard systems for providing either local or common battery service; the four-party line indicating key, the groundless sub-station, the insulated desk stand, the flash recall system, multiple line lamp distribution sys-

(*Please turn to page* 56)

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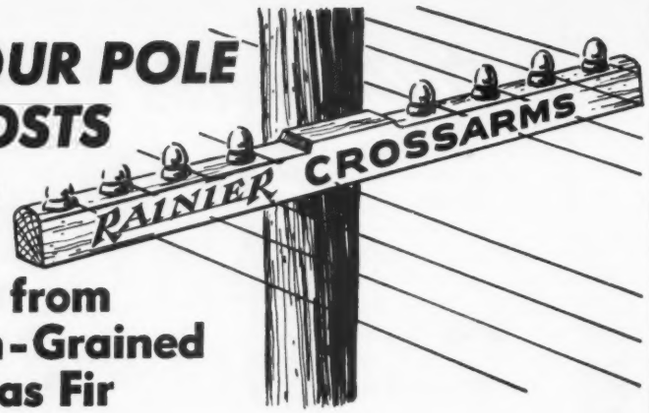

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tem, straightforward trunking, the Strowger or step-by-step automatic system, coin collectors, protective equipment, combined drop and jack, mechanical self restoring drop, steel telephone boxes, self-contained switch hook, and many other inventions—all important to the progress and development of telephone service.

By 1907, Independent manufacturers had made available equipment with which Independent operating companies could maintain good service in competition with Bell. They had demonstrated with the installation of large Independent switchboards in St. Louis and Philadelphia that they could produce common battery boards capable of providing good service without infringing on Bell patents.

In many respects the Independent manufacturers put their Independent customers ahead of the Bell. Independent companies had automatic equipment 20 years before automatic equipment of Western Electric manufacture was installed in Bell exchanges. The feature manual switchboard was produced by Independent manufacturers about 1914 but the first Bell installation of similar equipment was not made available until 1924.

Unattended automatic exchanges were introduced by Independent manufacturers in 1916, but it was not until 1930 that they were made available to Bell operating companies. Independent manufacturers placed the handset telephone on the market in 1916, and although Bell had a handset in the early years, it was not until 1926 that handsets were again supplied to Bell companies. One Independent manufacturer had produced handsets for 25 years previously and many of the handsets were sold in department stores to Bell subscribers.

Independent manufacturers also lead the way with the combination, or bell-in base, handset. One Independent manufacturer produced a form of the set as early as 1916 although it did not reach its perfected stage until 1928.

The achievements of the Independent manufacturers in the interests of Independent telephony are countless. They started with the pioneers. They were in at the beginning when the telephone was on its way toward changing the lives of men as they lived in their homes, as they worked in their offices, and to a more limited degree, as they spent their leisure hours. They saw many lines start out on barbed wire fences and they helped many companies that entered the tele-

(Please turn to page 58)

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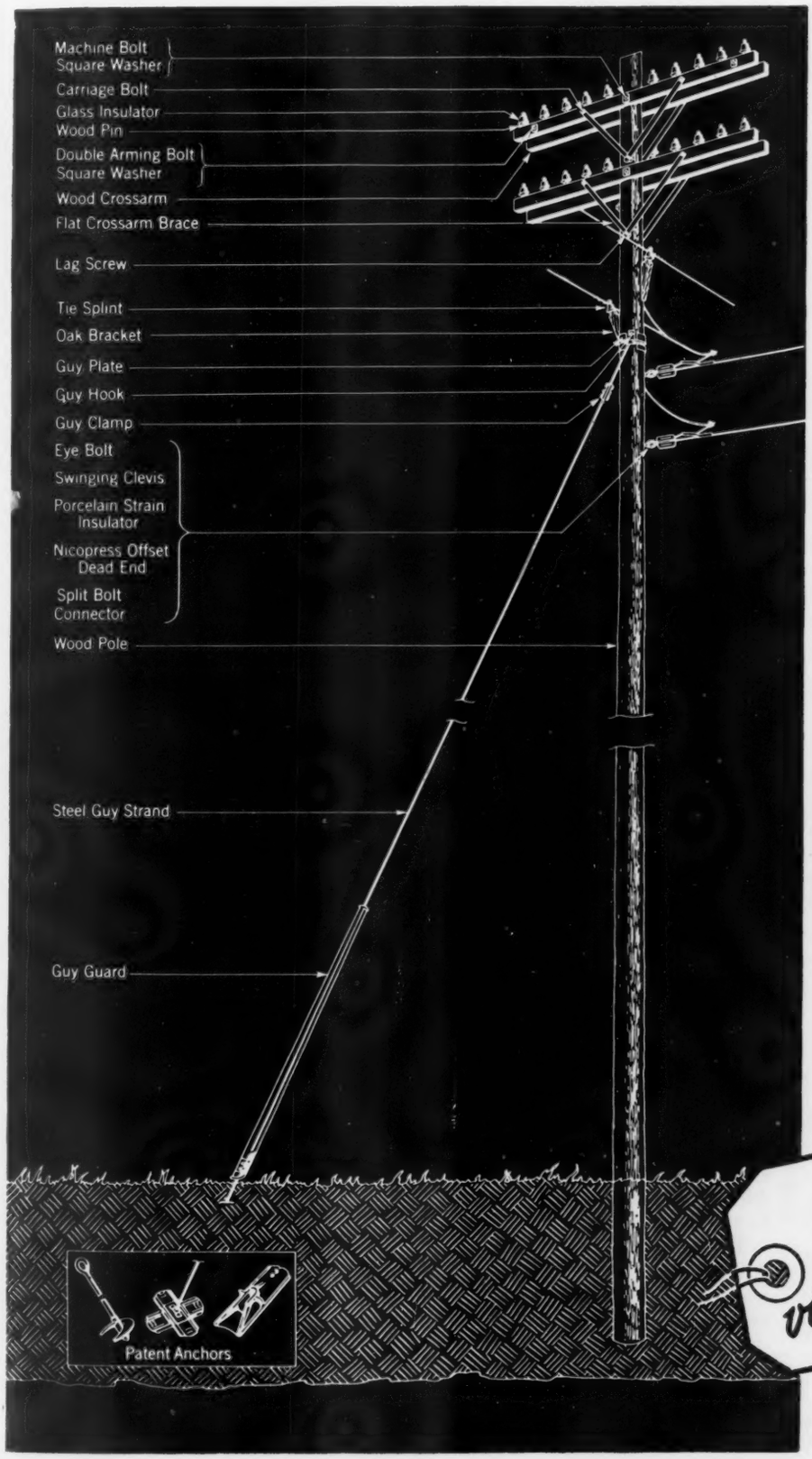

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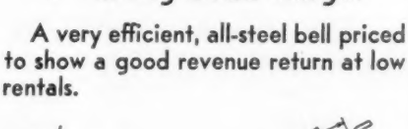

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phone business by passing the hat to obtain capital. And they were in on many of the early day skirmishes between Independents and Bell—and yet they, like the companies they served, grew humbly with the industry until today both the manufacturers and companies are valuable parts of the communications industry.

The Telephone Industry Today

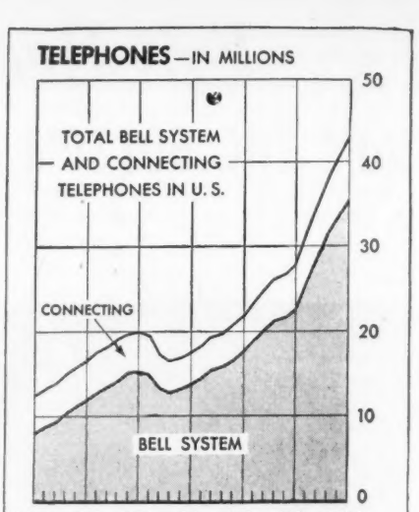
TODAY THE American telephone industry can be hooked up into a system serving 19,000 communities with Bell serving 7,000 and the Independents serving 12,000. The Independent telephone industry is one of the biggest little businesses in the United States. It is little because the great majority of the telephone companies operating outside of the Bell System are rural exchanges with a hundred or more subscribers and it is big because two thirds of the area of the United States is dependent upon the 5,600 Independent telephone companies and approximately 60,000 Independently operated rural lines for service.

The two telephones of 1876 have become 43,000,000 today. The first telephone line which was 100 feet long has grown to a system of more than 95,000,000 miles of wire and universal telephone service has been attained.

In the 75 years since Watson burst in Bell's room shouting, "Mr. Bell, I heard every word you said—distinctly!" an industry and service has developed that has transformed the whole pattern of living. For countless millions in cities and on farms the telephone has become an indispensable tool—in the hour-to-hour conduct of business, in the administration of government, in minor emergencies and great ones, and in maintaining family and community ties. Yet the industry strives to do more, to discover new and better ways of providing telephone service to its subscribers.

Bell once said—"Don't keep to the public road, going only where others have gone. Leave the beaten track occasionally and dive into the woods. You will be certain to find something you have never seen before. Of course, it will be a little thing, but do not ignore it. Follow it up, explore all around it; one discovery will lead to another, and before you know it you will have something worth thinking about to occupy your mind. All really big discoveries are the results of thought."

Today, as members of the telephone industry look forward from the telephone's 75th birthday to its 100th birthday they realize that no one can tell how far away are the limits of the art. Someday something we have never seen before, a little thing will turn up and telephone men will follow it, explore it, and from it will come another communication discovery.



Over forty-three million telephones now serve the people of the United States. In the performance of the industry as a whole, thousands of independently owned companies and systems operate nearly eight million telephones and make possible nationwide service.

Perhaps someday, some telephone man who gets off the public road will produce something that will make the prophecy once uttered by Theodore N. Vail come true. In that prophecy Vail said—"Someday we will build up a world telephone system making necessary to all peoples the use of a common language or understanding which will join all of the people of the earth into one brotherhood."

John J. Carty added to that prophecy in 1916 when he said—"I believe that the time will come when the historic bell which now rests in Independence Hall will be sounded and that by means of the telephone art it will proclaim liberty once more, but this time throughout the world, unto all the inhabitants thereof. And when the world is ready for the message, I believe the telephone art will provide the means for transmitting to all mankind a great voice saying 'Peace on earth, good-will toward men' . . ."

With such goals the telephone industry can only go ahead. Nothing can hold it back if it is allowed to continue to develop in this same climate of Freedom and Responsibility that has aided its progress for the past 75 years and made the industry an outstanding example of Free Enterprise at work.—THE END.

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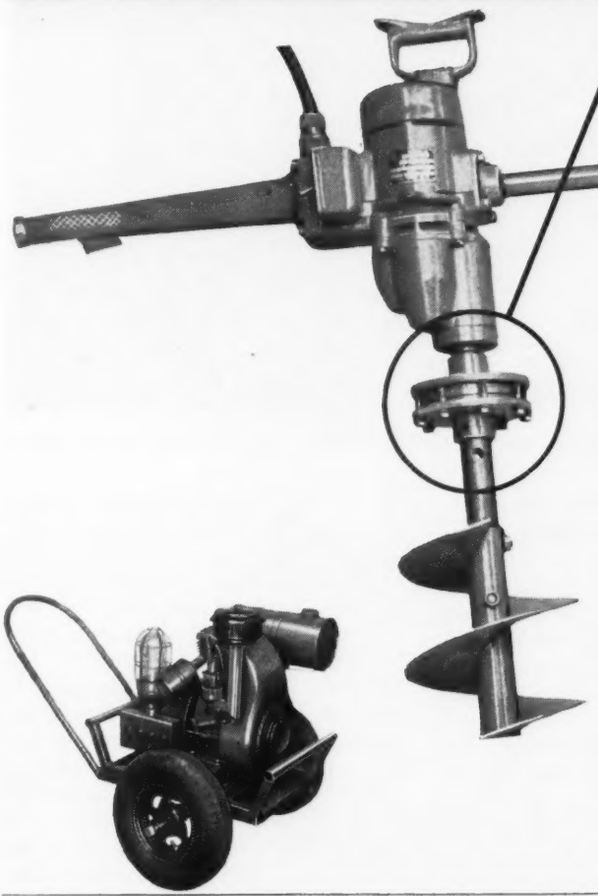

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J. A. Brady, president of the Louisiana Association, (left) Ray Dalton, USITA president (center) and Fred Strahan.

Louisiana Association Holds Annual Meeting

ALL MEMBERS of the telephone industry have wished many times that we had the power of hindsighters, soothsayers, fortune tellers, etc., and the officials of the Louisiana Telephone Association had reason once again to make that wish. For the 1951 annual convention of that organization was held at the Heidelberg Hotel in Baton Rouge on February 2 and 3—during the worst winter storm that has hit the South in 50 years. Attendance was therefore below what it had been in previous years, but as President Brady summed it up at the final session, "What we have lacked in attendance, we have more than made up in enthusiasm—each one here has been more than ever before able to meet and talk to and know everyone else present, and that has been valuable to all of us."

Everyone there agreed that it *was* a good meeting, and that America's youngest telephone association had done a good job on its convention. Officers of the association for the past year were: John Brady, president, James Nelson, first vice president, and secretary, Ed Schultz, second vice president, and Al Cobb, treasurer.

At the Baton Rouge meeting, three new directors were chosen, W. J. Camp, Sr., Clark Williams and J. M. Nelson. Directors whose terms did not expire are: John Brady, Al Cobb, Hooper Carter, Ed Schultz, W. T. Henning and Earl Conrad. Officers for the coming year were not elected at the convention; the official board will elect these at its next meeting.

The convention's opening address was made by A. T. Ramsey, general plant manager, Southern Bell Tel. & Tel. Co. His topic was concerned with plant construction and maintenance in the small telephone company, and his approach to each problem was practical and down to earth. It was the kind of talk that Mr. Ramsey said he liked to engage in back in the warehouse with his feet up on a keg of 3-bolt clamps. As much as his listeners appreciated the information he had concerning specific problems, they appreciated even more the manner in which he worked up to his answers—a common sense sort of reasoning that a lot of us had almost forgotten in these days when machines have been tending more and more to take the place of thinking.

Mr. Ramsey talked at length on the principle of flexibility in pole line construction. He compared the cost of fancy testing and maintenance machines with the cost of fixing an occasional bit of trouble which the machine might have prevented, and concluded that the importance of preventing trouble must be weighed against the cost of preventing it. He

D. B. Corman, consultant to Claude R. Wickard, REA Administrator, Washington, D. C., addressing delegates to the Louisiana convention.

"Good night, Doc . . . and thanks!"

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pointed to the fact that 80% of cable sheath faults occur within a man's reach of a pole, and concluded that a visual and touch inspection of this part of the cable every time a man went up a cable pole was one of the best and least expensive preventative cable maintenance procedures.

Bill Corman, manager of the Southland Telephone Company of Atmore, Alabama, was the next speaker. He took as his topic, "The Relationships of Small Telephone Companies". The speech in full appeared in the February, 1951, Telephone Engineer and Management.

Ray Dalton, USITA president, was the final speaker of the first day. He presented a clear discussion of the problems that the industry has faced in the past year and a thoughtful explanation of those that will probably have to be faced in the near future.

Mr. Dalton referred at length to recent FCC action against the AT&T concerning reduction of interstate long distance rates. He stated that should such action be carried through, there would be an even greater discrepancy between inter and intra-state rates and commented that such action would have an adverse effect on the Independents. He stated that the USITA Committee on Toll Settlements was hard at work on this matter, and is hoping to emerge with an agreement with the Bell System Companies for a higher toll settlement compensation.

Mr. Dalton proved to all the delegates once again, just as his predecessors have been proving for years, that even those men at the top of the Independent Telephone Industry are easy to meet, easy to like, and well worth knowing.

At the banquet on Friday night, J. M. Bennett, assistant state director for Civil Defense of Louisiana, spoke on "Civil Defense". Mr. Bennett pointed out the work that Louisiana was doing on civil defense, and then went into some of the considerations that must be dealt with in setting up this defense.

Mr. Bennett had a tremendous amount of factual information at hand. He discussed objectives of civil defense, the limiting factors on it, the cost of it, and the methods by which all of these could be integrated. By the time he had finished, the delegates all felt that they at least had some concept of the size, scope and importance of this—for Americans—new activity.

The first speaker of the second day was Ben Hatfield, Southern Bell Tel. & Tel. Co., discussing toll line dialing. Mr. Hatfield described the general processes by which operators dial direct to distant telephones. He then enumerated the features that should be incorporated in the automatic boards of Independent companies in order that their equipment could fit into the national scheme of toll dialing and stressed the need for consultation and cooperation when such equipment is being ordered, installed, and after it is in use, in order to insure a satisfactory, fast, nationwide service.

The final speaker, Daniel B. Corman, consultant to Claude A. Wickard, administrator of the Rural Electrification administration, brought the story of the REA rural telephone loan program to the convention.

Mr. Corman reported that during the one-year life of the program there have been 715 applications for loans from 42 states. As of Jan. 1, 1951, REA has made 66 loan allocations, he said. These loans provide $21,318,000 for the improvement and extension of telephone service to 82,000 rural people. As of Dec. 31, 1950, nine loan contracts were signed.

There have been 25 loan applications from Louisiana and six loan allocations, according to Corman. No loan contracts have been signed in Louisiana.

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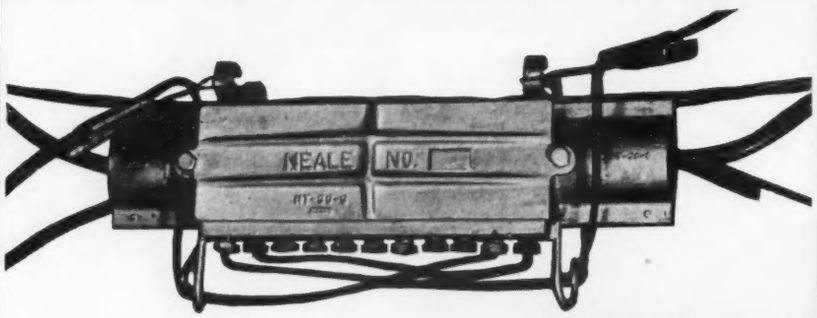

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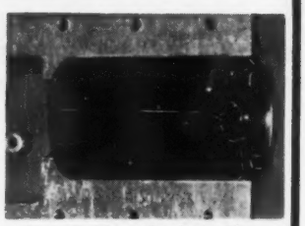
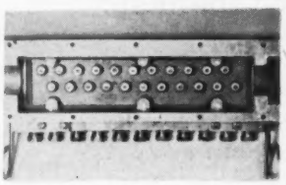

End Rubber Sealing Plug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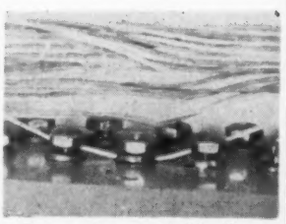
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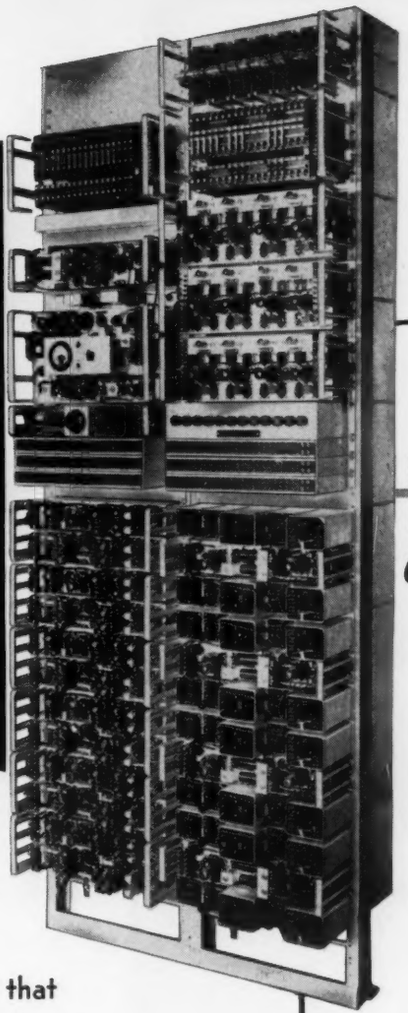

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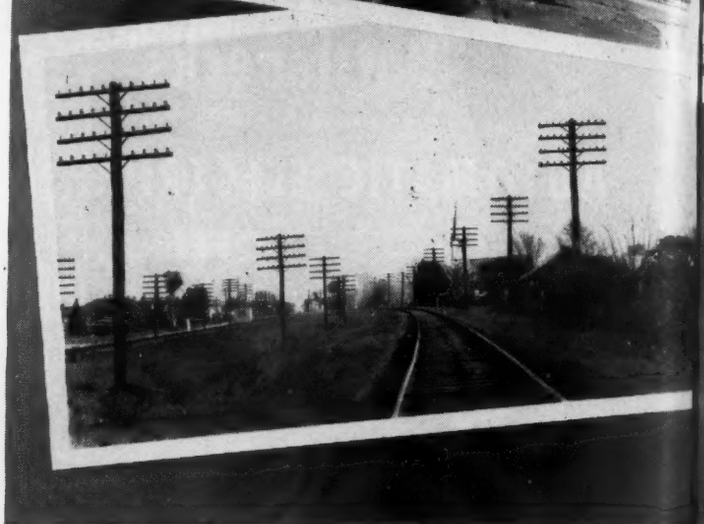

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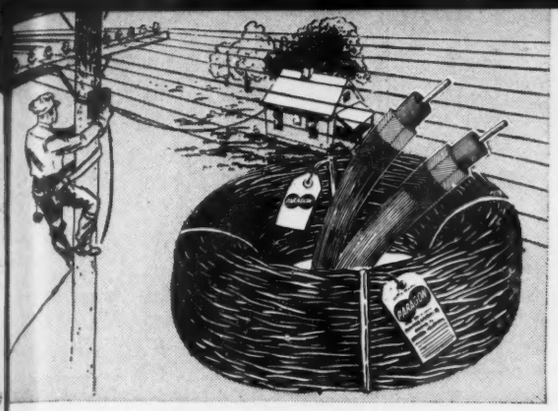

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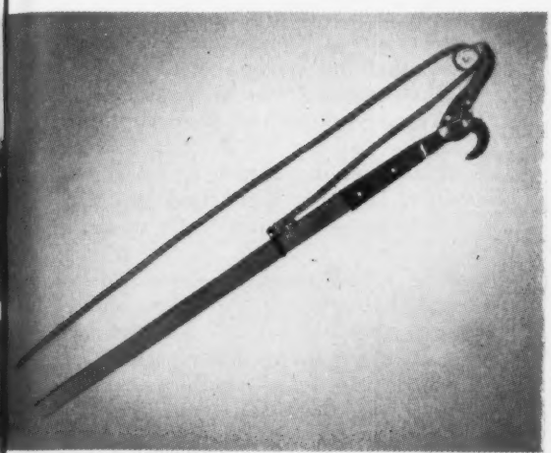

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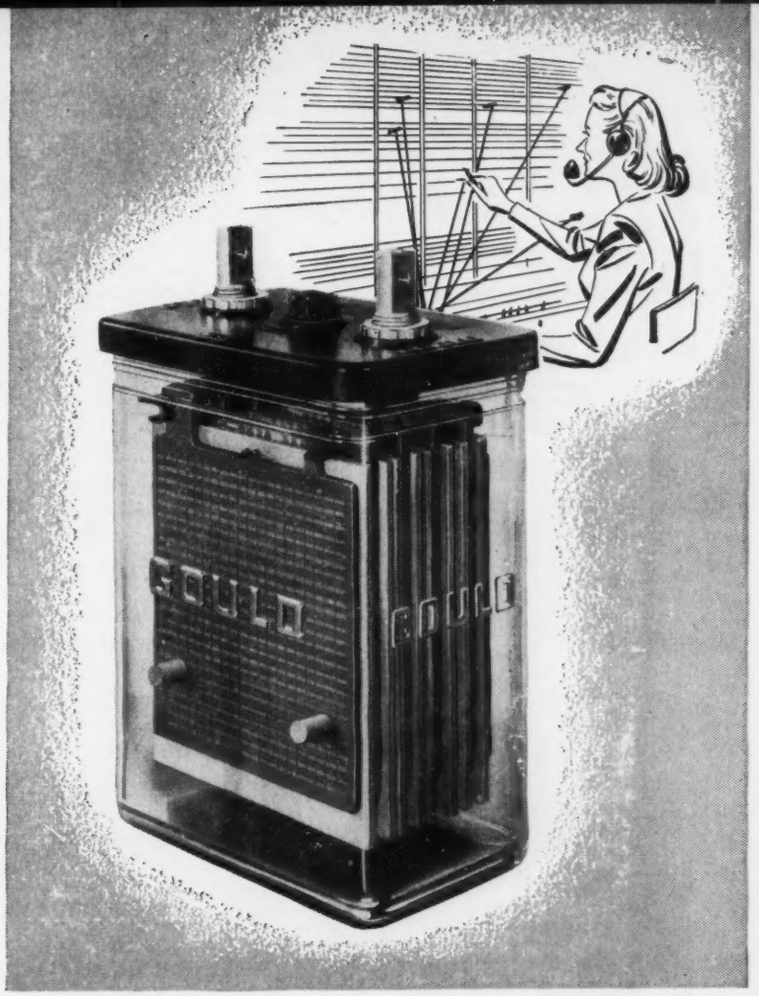

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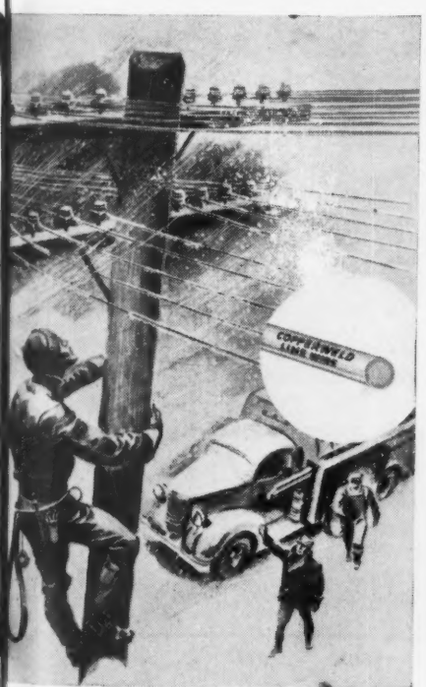

ther Hazards are not problems when you use pperweld Line Wire. Thick copper covering sts corrosion. Alloy steel core permits ger spans and provides strength to withstand vy ice and wind loads. This long-lasting wire nade by COPPERWELD STEEL CO.

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Buy Through Your Supplier

American Tel. & Tel. 1950 Earnings Rise To 21-Year Record High

THE BELL SYSTEM served nearly two million more telephones in 1950, and handled two and a half billion more telephone calls than in any previous year, Leroy A. Wilson, president of American Telephone and Telegraph Co. stated in the company's annual report.

"The national emergency brought a new tide of telephone demand," he said. "The Bell System is alert to its essential task and is preparing further. The System will do its full part in helping to keep America secure. That is our Number One job today."

Nearly $900 millions were spent to expand and improve service in 1950. In the last five years the System has spent almost five and a half billion dollars for these purposes. Investment in telephone plant is now $10,101,521,562.

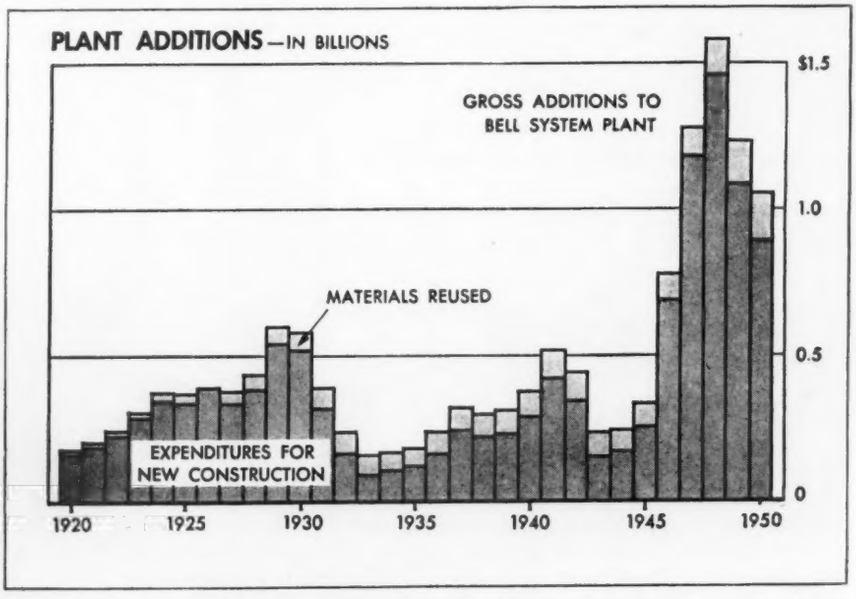
There was an increase of 156,000 owners of AT&T stock in 1950—the largest in any year—and stockholders now number more than 990,000. Better than one in every 45 families in the United States shares directly in Bell System ownership.

Net operating income in 1950 was less than 4.5 per cent on telephone plant. Wilson said the return would be even lower if the plant were valued at present costs. The rate of earnings on capital was 6.1 per cent, compared with 4.9 in 1949 and 7 per cent in 1940.

Consolidated net income of the Bell System applicable to AT&T stock was $346,962,000, or $12.58 per share as compared with $9.70 per share in 1949. Income of the A. T. & T. Co. by itself was $10.40 in 1950 compared with $9.49 in 1949. Investment per share at the end of 1950 was $138, compared with $135 at the end of 1949.

While the proportion of debt in the System's capital was slightly reduced in 1950, it is still about one half of the total capital, and this level Wilson described as "much too high." He said that full conversion of convertible debentures, now outstanding and currently offered, together with sale of the balance of shares of stock which may be issued to employees under the plan authorized in 1946, would reduce the debt ratio to about 37%.

As a long range objective, Wilson said, the proportion of debt should be further reduced. "When the System entered the post-war period, less than a third of its capital was debt," he pointed out. "That made it possible for the Bell Companies to obtain, in a very short time, the enormous amounts of new money needed to meet unprecedented service demands. We should be no less well prepared for the future. With rates adequate to maintain the necessary earnings, most of the company's convertible debentures would be converted into stock and the debt would be reduced." Wilson said that wage,



Almost $5,500,000,000 has been expended by the Bell System in the last five years to meet the demands for telephone service during the postwar period and to improve the quality of service.

STRONGER

Taylor-Colquitt VAPOR-DRIED POLES

Taylor-Colquitt's exclusive process of drying timber with hydrocarbon vapors produces poles that are definitely 20 to 25 per cent stronger than those steam conditioned in the conventional manner before creosote treatment.

This increased strength permits users to install poles one class lower than would be needed if other types were used. Not only does this result in substantial savings in pole costs but is also reflected in worthwhile reductions of installation expense.

With added strength go the careful timber selection, precise manufacture and adequate preservative treatment that have long made Taylor-Colquitt Creosoted Pine Poles so justly celebrated.

For greatest long time economy always specify Taylor-Colquitt Vapor Dried Creosoted Pine Poles.

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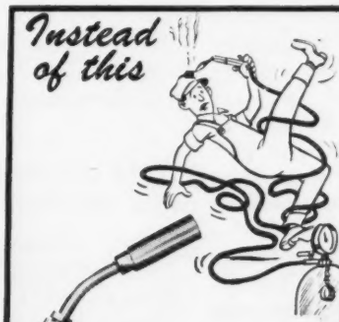

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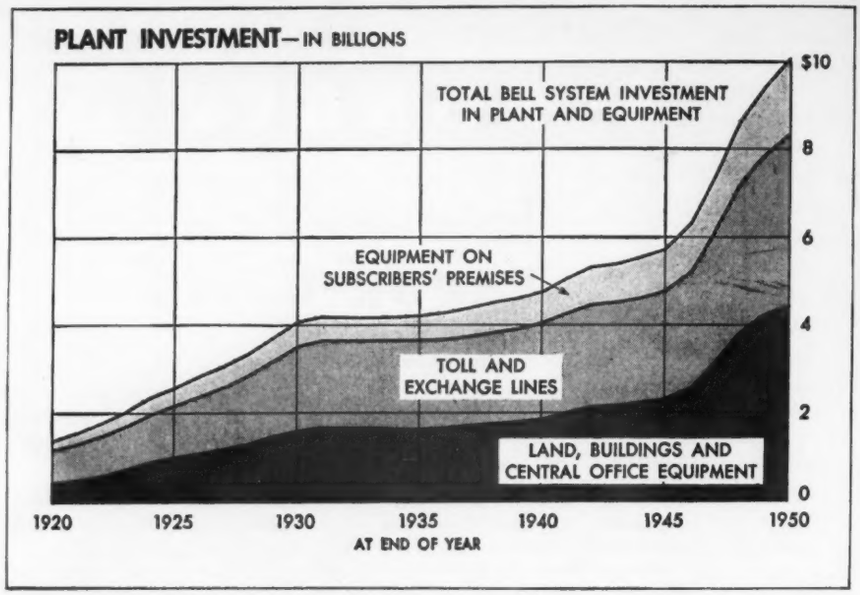

$10,100,000,000 is invested in the physical facilities of the Bell System. The greater part is in central office facilities and outside lines, a much lesser part in equipment on customers' premises.

material costs have continued to mount. Taxes on Bell telephone service in 1950, including excise taxes, totaled a billion dollars, or about $2.65 per telephone per month. Over the war and post-war years labor and raw material costs have doubled. Total payroll of the System in 1950 was more than two billion dollars. In addition, $199,000,000 was spent for benefit and pension purposes.

Recalling that the telephone industry has long been under continuous public regulation, Wilson said, "Regulatory authorities through the years have generally had the wisdom to approve levels of rates that have permitted good service, fair wages and reasonable earnings. The outstanding development of the telephone in this country is due in no small measure to this fact." Applications for increased rates are pending in most states and others will be made "as necessity requires." However, telephone rate increases in the war and post-war years, together with those requested, are reported to average less than 25 per cent of Bell System revenues. Rate increases so far amount to only a little more than half the current annual cost of telephone wage increases alone.

"Only a financially strong telephone system," Wilson commented, "can contribute the most to the strength of the nation . . . The Bell System is meeting all communications needs of military and civilian defense authorities. The whole expansion and improvement program of the telephone system since World War II has made it more sturdy, more useful, more convenient, and a greater asset to the nation."

Defense requirements and shortages of materials are making it more difficult to meet all civilian telephone needs but the report states that every effort to that end will be continued.

There was an increase of 1,955,000 Bell telephones during 1950, bringing the System total to 35,300,000. Farm telephones were added at the rate of 1,000 every working day. Dial service was further extended; 76% of the telephones in service are dial and more than one-third of all toll and long distance calls are now dialed straight through by the operators.

Rate Hike Approved For Footville, Wis.

THE WISCONSIN Public Service Commission authorized the Footville (Wis.) Telephone Co. to raise its rates to bring in estimated additional revenues of $4,655 a pear.

Under the new rates, one-party business service will be $4.50 a month; one-party residential, $3.75, and four-party residential, $3.

Chas. Weldon Heads New Rural Co-op

A TEMPORARY organization has been selected for the Farmers' Telephone Cooperative in Breckenridge, Mo. The co-op plans to serve 2,000 members.

Members of the temporary committee elected to set up the organization are Charles Weldon of Breckenridge, chairman, Kenneth Tomlinson, Lock Springs, vice-chairman, C. A. Earl of Breckenridge, secretary, and Fred Williams, Jameson, treasurer.

Constructio
With the Doub
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A very rugged Protector, ass
bled on a bracket of heavy ste
instead of porcelain—to take ro
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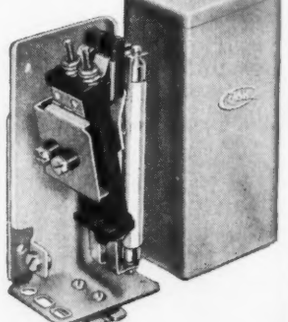
outstanding features:

1. Uses a Cook Standard Type
Protector unit with molded bak
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electrical and physical shocks.
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mary and secondary arreste
The secondary arrester provid
a path to ground for lightnin
should the fuses be blown.
3. Mountings contain heavy stud
for connecting drop wires an
ground.
4. Equipped with heavy zinc weat
erproof hood, and bracket f
mounting on post, wall, etc.
5. All structural parts, includin
hood and bracket, are ground
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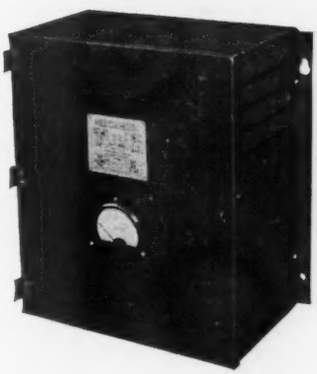
battery eliminator and ringing supply all in one!

raytheon's new RectiRingeR

The new RectiRingeR consists of a time-tested Raytheon RectiFilteR to supply humless, regulated DC power for the switchboard, and an adaptation of an exclusive saturable core reactor to supply 20 cycle ringing power. Field-tested for more than twenty years, these two units are now combined to provide trouble-free power for switchboard and 20 cycle ringing.



The Raytheon RectiRingeR is also equipped with a relay which automatically connects the switchboard to a source of standby power, if the AC power source should fail. Complete specifications on request.

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Exclusive Floté grid design not only retards peroxidation but provides exceptional strength and electrical efficiency. Grids are cast of hard lead alloy that virtually eliminates antimony plating and substantially cuts the rate of self-discharge. This results in lengthened grid life and exceptional full-float service. Solve your battery problems by specifying Floté.

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GOULD-NATIONAL BATTERIES INC.

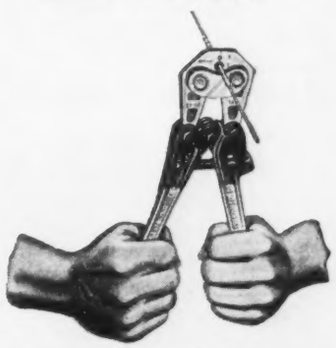
make line splices faster with nicopress splicing sleeves . . .

For line splices that *can't* pull out, made in half the time, specify *Nicopress* Splicing Sleeves!

Nothing could be simpler than making a splice in a jiffy with *Nicopress* equipment. Here's all you do:

1. Clean the wire end

2. Insert wire in sleeve



3. Compress sleeve with *Nicopress* tool

The result is a splice that will hold up for the life of the wire. Specify *Nicopress*—the finest in Splicing Sleeves!

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for your PBX and SMALL SWITCHBOARDS

THE LORAIN
SUB-CYCLE
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Here combined in one cabinet is both a *Ringing* and a *Talking* power supply. They provide a choice of either 20 or 30-cycle SUB-CYCLE RINGING CONVERTERS, and are available in 4 Models.

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- RT-1—3½ W. 20-Cycle ringing +.87 amp. 14-28 V. DC talking.
- RT-2—3½ W. 20-Cycle ringing +2 amp. 24 or 34 V. DC talking.
- RT-3—3½ W. 30-Cycle ringing +.87 amp. 14-28 V. DC talking.
- RT-4—3½ W. 30-Cycle ringing +2 amp. 24 or 34 V. DC talking.

For Details See Bulletin 159

LORAIN "T-UNITS"

- T-1—0.87 amp. 14-28 V. DC talking
- T-2—2.0 amp. 24-34 V. DC talking
- T-3—0.5 amp. 22-30 V. DC talking
- T-4—1.0 amp. 40-52 V. DC talking
- T-5—0.5 amp. 10-16 V. DC talking
- T-6—1.0 amp. 5-8 V. DC talking

For Details See Bulletin 159

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FLOTROL
PARTNERS IN DEPENDABILITY
SUB-CYCLE

Markets

(*Continued from page 36*)

On the basis of the foregoing, the company showing such earnings should be able without difficulty to sell the indicated bonds, preferred stock and common stock at 100% of their par value, in fact when the credit of the company becomes established in the market its common stock should sell at something more than the par value, say at least its book value. In the table above the common stock book value would be 125.

In the determination of market price for any security, whether for a new offering or for securities already outstanding in the market, there are factors other than recorded earnings which are almost invariably considered by investors. One of these is the trend of earnings, the direction in which they have been moving; a persistent uptrend is one thing, irregularity or downtrend another. Another factor is investor opinion as to future developments, including future earnings; another is management, its character, its reputation and standing in the capital markets available to the company. In some cases the presence or absence of a financially strong and well-managed holding company is a factor in price determination for the securities of the subsidiaries. And many informed investors, in particular institutional investors, attach great importance to the record and attitude of the respective regulatory commission. Therefore, market price determination for any security is not a purely mathematical process, and the incidence of these intangible factors frequently modifies to some extent appraisals based on the tangibles.

Bonds and Debentures

The slow downdrift in prices for new bond issues, which has been in progress now for nearly a year and which received comment in our December number, continued during the most recent period. As measured by yields on new offerings and private placings, the picture is very definite. For A rated bonds of electric utilities, which a year ago were being readily placed at such yields as 2.66% to 2.75%, the range lately has been 2.80% to 2.90%, with some even at 3.00%. The higher rated Aa bonds were being placed a year ago at 2.70% or less, but since March 1950 any company that tried to place such bonds at less than 2.70% has met with failure, and lately even a 2.85% yield for a first class name has met rough going.

For example, in January 1950, Commonwealth Edison of Chicago sold some 2.75% Aa rated debentures at 2.74%; its latest offering was in January of this year 2.875% also rated Aa; this was priced at 101.335 to yield 2.85%, but after struggling with it for some weeks the underwriters turned it loose and the bonds promptly sank to 100 bid, which is less than the underwriters paid for them. Southern California Edison in late February offered first mortgage bonds at 2.80%, which met with a cool reception. Even such a strong credit as New England Power Company, offering in late February 30-year first mortgage bonds at a 2.77% yield, found the selling slow.

This downtrend in bond prices on new offerings, or its equivalent the uptrend in yields, is not a new development. Consider the terms on which the four presently outstanding issues of American Telephone & Telegraph convertible debentures have been placed, all with stockholders at the price of 100.

1946—15-yr. 2.75 %, conv. into stock at 150
1947—10-yr. 2.75 %, conv. into stock at 140
1949—10-yr. 3.125%, conv. into stock at 130
1951—12-yr. 3.375%, conv. into stock at 138

Undoubtedly the controversy between the United States Treasury and the Federal Reserve System, which continues with no end in sight, has contributed to the unsettlement in the high grade bond market, and stiffened the attitude of institutional buyers.

The huge new offering of American Telephone & Telegraph convertible debentures has not weighed on the market, but rather has had a constructive influence. At the end of February these debentures on the New York Stock Exchange, offered to stockholders at 100, were selling on a when-issued basis at 116; and the capital stock of the company, which during the first six weeks of the year had ranged from 150 to 154.75, was selling at 157.50.

A small issue of unusual type in the independent telephone field was the offering in February of $400,000 Thomaston (Georgia) Telephone Company first 3.50% at 100. These bonds are due serially, the installment payments beginning at $12,000 in each of 1952 and 1953, scaling up each two years to $26,000 in 1970 and 1971. The total annual payments for interest and retirement are arranged for approximately equal amounts each year, something like a cumulative sinking fund, to retire all of the bonds within 20 years.

Preferred Stocks

BOTH TELEPHONE and electric utility preferred stocks have lost favor with the investing public dur-

ing the past six months or so. This is more strikingly apparent from examination of trading market prices for outstanding preferreds than it is from almost any comparisons that can be made from the record of new offerings, because so few companies during the period have come back to the markets with a second offering of preferred stock. But at December 30, 1950, practically every telephone utility preferred which is actively traded on an exchange or is regularly quoted, was bid a lower price than had been recorded for it during the first few months of the year. More or less the same is true of the electric utility preferreds.

Earnings per share of the telephone utility preferreds have been very irregular, some of them in 1950 showing at approximately half the 1949 figures. By contrast the per share earnings of the electric utilities have been stable, some of them have shown an upward trend.

Few new offerings of telephone preferreds have been made during the last three months and the supply of electric utility preferreds has also been scant.

Common Stocks

THE NEW OFFERINGS of telephone utility common stocks reported during the three months December-February were of small number and all of them of small amount. None of the companies listed has come to the market with sufficient frequency to make possible any observation of price trend on new offerings in this classification. But in the trading markets telephone utility commons, taken as a group, have definitely been losing ground. On the other hand American Telephone stock has been strong, having benefited substantially from the activity engendered by the trading in rights for the new 3.375% debentures.

Electric utility offerings of new common stock have been fairly numerous and some of them of large amount. As a rule they have been well received, most of them oversubscribed. In the trading markets, however, electric utility commons have weakened more or less like the telephone commons.

Neither one of these groups has shared in the strong uptrend in common stock prices which has been a feature of the market for several months, although in February the rising curve flattened out. In the utility field the certainty of higher taxes and higher wage costs has been a factor, together with uncertainty as

(*Please turn to page* 72)

LOWELL insulated wires

drop wire and inside telephone wire

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IN AUGER-DRILLED HOLES

Poles set in auger-drilled holes with the new Dicke Pole Tamper have more resistance to strain than poles set by ordinary methods. Spade-shaped tamping head of forged steel is concave for close-in tamping around base. Handle available in two lengths, 8 feet and 10 feet. Your lineman can set every pole solid with the new Dicke Pole Tamper.

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to how far these costs will increase. And in the telephone industry especially, the long delay of some state commissions in granting rate relief has been discouraging.

The higher taxes and wages had not taken a very heavy toll of earnings per share up to the latest published company reports, but numerous estimates have been made on the per share reductions which even the present rates would make in the next twelve month period.

The markets for new issues of all kinds, bonds, preferred and common stocks, have lately been very dull. Outside of a few big debt offerings like the Telephone $420 million, Consolidated Edison $60 million, and the Commonwealth Edison $49 million, there has been little to work on. Many new offerings, however, are in registration or otherwise in preparation for offering during the next few months.—THE END.

"Questions And Answers"

(*Concluded from page 47*)

lications but find them too technical or too much theory. What I have in mind is a service manual that will cover each component part and simplified means of determining whether such part has broken down.

It seems the Bell Company at one time had such a manual and furnished each of their trouble shooters with it. I am enclosing a stamped envelope for your convenience and thank you.

ANSWER:—With a desire to be of the greatest possible assistance this general request was read to Mr. Daniel McNulty of TELEPHONE REPAIR AND SUPPLY COMPANY by telephone. In reply, I am very glad to state, Mr. McNulty offered to send to this company a copy of the booklet issued by his company. Of course the QUESTION AND ANSWER column is open to any particular inquiries and they will be answered in such a way, if possible, as to be easily understood by any telephone man. The current series of articles now running in this column on the use of the voltmeter in telephone plant maintenance should be of considerable help in most cases. In addition it is my suggestion that this company purchase an ohmmeter, which will not be very expensive, unless it is desired to purchase a standard voltmeter and equip a fully efficient testing turrett. Many items of testing equipment can be acquired now at small cost. After receiving the literature which will be sent you please write in again if I can be of any specific help.—THE END.

Montana Co-op Plans Five-County Service

TELEPNONE COMMITTEES from five Montana counties recently selected "Mid-River Telephone Cooperative" as the name for a new telephone organization. Approximately 45 telephone committee members were present at a meeting in Circle, Mont., when the name was selected.

The co-op has forwarded an initial survey to the Rural Electrification Administration, Washington, D. C. More than 1200 applications were included on the survey from the five counties. This survey is not a loan application, but includes information which the REA examining committee will use to determine feasibility of the telephone system. If the telephone concentration is great enough a loan application will be made.

William Porter, Circle, Mont., is chairman of the new co-op.

Associated Tel. Co. Files New Rate Request

THE ASSOCIATED TELEPHONE CO. Ltd., Santa Monica, Calif., which has had a $3,241,000 rate increase pending before the California Public Utilities Commission since last August, asked Feb. 2 to add another $2,500,000 to its request.

The company said its last rate increase, $2,200,000 granted last May, had produced only a 4.41 per cent return for 1950. Because of rising labor costs and higher federal income taxes, company officials told the public utilities commission, they were forced to seek permission to charge even more than they anticipated when they filed their first additional request in August.

Co-op Organized At Breckenridge, Mo.

THE FARMERS Telephone Co-operative was formed at Breckenridge, Mo., recently when more than 200 farmers met to pool their efforts to organize a telephone system for rural sections in the area. The co-op will attempt to provide dial service in all rural sections in Davies and adjoining counties.

Charles Weldon was elected president of the co-op.

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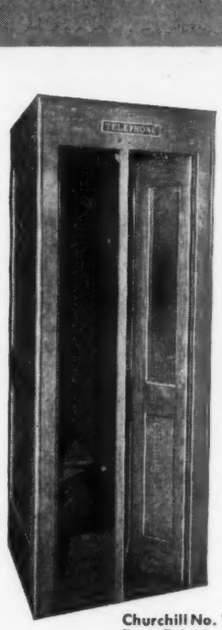
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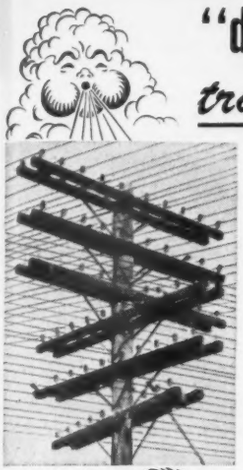

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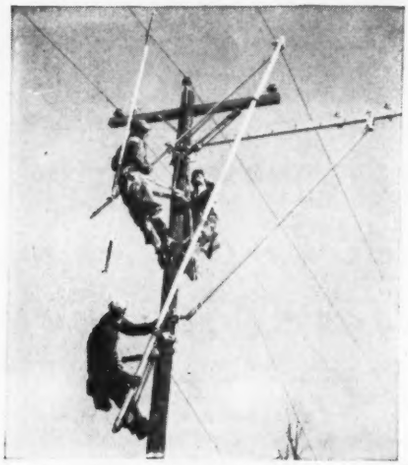

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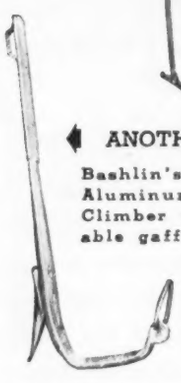

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(Continued from page 39)

shorted) the ohmmeter will show about 95 ohms representing 80 ohms for the receiver plus 14 ohms (approximate) for the induction coil.

(3) Next work the receiver hook up and down several times to test its performance. Make sure it opens and closes the receiver circuit properly. This will be shown by the changing reading on the ohmmeter. It will be necessary to short out the capacitor in the receiver circuit.

(4) With the receiver restored to the hook, turn the generator crank a fraction of a turn just sufficient to cause the shunt spring assembly to connect the generator across the line. The ohmmeter should now drop from 1600-ohms to approximately 300 ohms (or to whatever resistance the generator should normally have). The ringer resistance is, of course, in multiple with the generator and will cause the reading to be slightly lower than the resistance of the generator alone.

The troubleman should be provided with data giving the resistance of various makes and types of generators so he can readily determine whether or not a reading obtained is the correct value.

As occasionally happens, a generator winding may be partially shorted out due to lightning or other causes and this can be easily detected if the normal resistance of the generator is known.

After the overall terminal tests just referred to have been made, a further *component check* should be made. The condition of the capacitor can be checked by noting the "charging deflection" in the meter when the ohmmeter is connected across its terminals. It should show no leakage.

Next connect the ohmmeter across each pair of hook-switch contacts *using the lowest resistance range.* Operate the hook switch contacts and note whether positive contact is obtained.

Oxide coating or dirt on the contact points will show up as a varying resistance of an ohm or so. Make this check by clipping on to the induction coil and receiver terminals rather than directly to the hook switch. If the springs seem to have proper tension and movement yet

Table No. 1—Miscellaneous Applications of Sensitive Ohmmeter in Cable Testing

(A) Use to measure leakage between pair conductors or conductors to ground (High resistance range).

(B) Use to check approximate distance to solid shorts and grounds. (Use range which gives near mid scale reading.

(C) Use to identify conductors. (Use medium or low resistance range.)

(D) Use to identify groups of conductors by difference in capacitance kick. (Use highest resistance range).

(E) Use to check approximate distance to open. (Use highest resistance range).

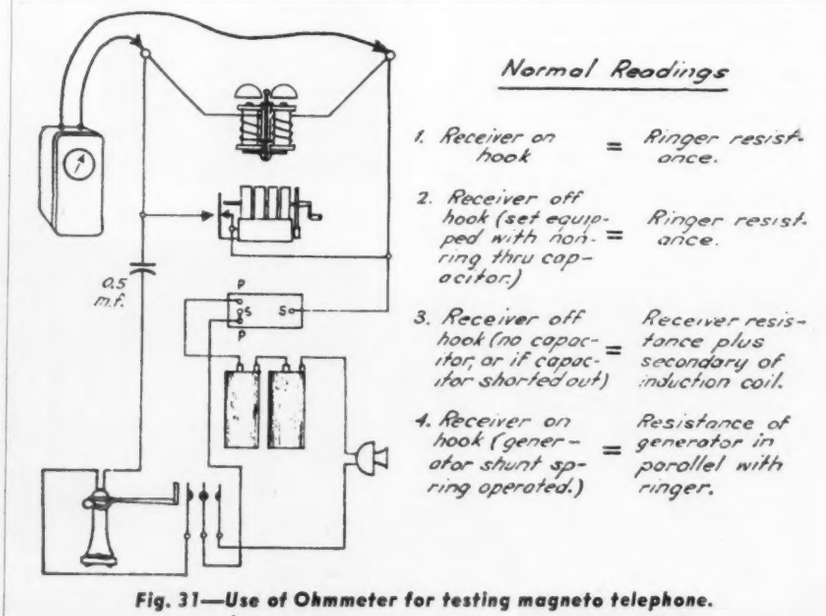
Normal Readings
1. Receiver on hook = Ringer resistance.
2. Receiver off hook (set equipped with non-ring thru capacitor.) = Ringer resistance.
3. Receiver off hook (no capacitor, or if capacitor shorted out) = Receiver resistance plus secondary of induction coil.
4. Receiver on hook (generator shunt spring operated.) = Resistance of generator in parallel with ringer.
0.5 m.f.

Fig. 31—Use of Ohmmeter for testing magneto telephone.

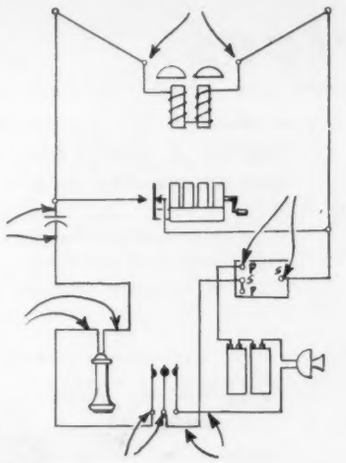

Fig. 32 — Component test on magneto telephone.

show faulty contact resistance a small burnisher should be used to brighten the contacts. As a matter of fact, it is generally desirable to burnish the contacts regardless of whether they test o.k. or not.

In checking the contacts which carry the battery to the transmitter disconnect one side of the battery so as not to subject the ohmmeter to the battery voltage.

When a particular component is suspicioned of giving trouble yet seems to test o.k. the trouble can often be brought into the open by connecting the ohmmeter to the component, then observe any fluctuations in readings as the part under suspicion is gently disturbed, moved, or pressed. For example, a ringer which is reported as being erratic in operation might show a drop or increase in resistance or go entirely open when the coils are touched, squeezed, or moved slightly. Receiver cords which have a tendency to cut out are quickly detected by this test. The same test is useful in detecting partially open or partially shorted induction coils. Various types of component tests are shown in *Fig.* 32.

Carbonization Trouble in Generators

A fairly common yet difficult type of fault to locate results from carbonization of the generator shunt spring insulation due to lightning. A study of a magneto telephone circuit will show that both line terminals are brought close together at the shunt spring assembly on the generator. Induced lightning potentials on the two sides of a telephone circuit often times tends to equalize by arcing

(*Please turn to page* 77)

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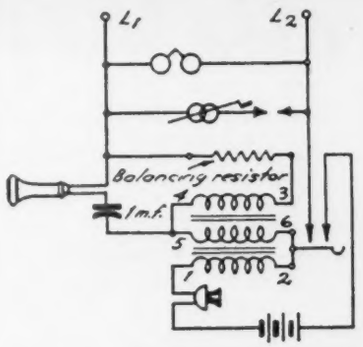

Fig. 33—Circuit of local battery anti-sidetone telephone.

across the shunt springs. In so doing they leave a carbonized path on the small insulating washers and bushings. This tends to short out the line circuit of the telephone.

This type trouble is particularly difficult to detect because the resistance of the short varies—one time it may be virtually a solid short and a few minutes later (usually when the generator is operated) it may be much higher in resistance or may entirely clear itself. This particular trouble is readily run down by using the ohmmeter as suggested.

To make this test disconnect the ringer and with the ohmmeter connected to the L_1 and L_2 line posts press or wiggle the spring assembly slightly. If a fault is present it will generally show up as a short or partial short on the ohmmeter.

The L. B. Anti-Sidetone Circuit

THE LOCAL battery anti-side tone circuit found on the newer magneto sets differs only slightly from the older magneto circuits. A simplified schematic is shown in *Fig.* 33. It will be noted it has an extra winding and a balancing resistor. It is tested in practically the same way as the older magneto set. The extra third winding and resistance is connected across the receiver and this must be taken into account in the measurement.—(*To Be Continued*)

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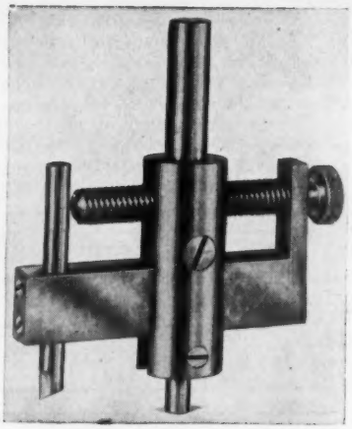

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ANCHORS, Plastic Expanding, Universal. All Purpose—Mount in any Material, Holub Industries, Inc., 424 DeKalb Ave., Sycamore, Ill.—[ADV. 3]

ANCHORS & WIRE CONNECTORS—Matthews Scrulix Anchors, Matthews Telephone Wire Connectors. Write for bulletins. W. N. Matthews Corp., St. Louis 16, Mo.—[ADV. 4]

AUGER—The "Alaska Frost Auger." Free trial on your own machines. Henning Electric Motor Co., P. O. Box 786, Fargo, N. D.—[ADV. 5]

BATTERIES, Dry Cell—The Ray-O-Vac Company, 2317 Winnebago St., Madison, Wisc.—[ADV. 6]

BATTERY—WATER UNITS Demineralizers for Tap Water—A. E. Tomkin & Co., 1828 Columbia Rd., N.W., Washington 9, D. C.—[ADV. 7]

BELTS — CLIMBERS — COMPLETE LINEMEN'S EQUIPMENT. W. M. Bashlin Co., Bashlin Bldg., Grove City 1, Pa.—[ADV. 8]

BLOCKS, AERIAL CABLE—"Tug-O-Wheel" aerial cable blocks for safe and speedy installation of all types of aerial cable. Tug-O Wheel Products Co., Ballston Spa, N. Y.—[ADV. 9]

BOOTHS—Acoustic Telephone—Sherron Metallic Corp., 1201 Flushing Ave., Brooklyn 6, N. Y.—[ADV. 10]

BOOTHS—Churchill Cabinet Co., 2119 Churchill St., Chicago 47, Ill.—[ADV. 11]

CABLE, All Plastic, Aerial, Duct, Direct Burial, PBX, Switchboard.—The Ansonia Electrical Co., Ansonia, Conn.—[ADV. 12]

CABLE SPINNING—The Cable Spinning Equipment Company, 432 Crane St., Topeka, Kans.—[ADV. 13]

CARRIER EQUIPMENT—Adler Telephone & Telegraph Carrier Equipment has been standard for twenty years in the Independent Field. Mfd. only by Southern Electric & Transmission Co., 3127 Holmes St., Dallas, Texas.—[ADV. 14]

CONNECTORS, CABLE—Cannon Electric Development Co., 3209 Humboldt St., Los Angeles 31, Calif.—[ADV. 15]

CORDS, Instrument and Operators—Commercial Cord & Supply Co., 26 Main St., Clifton Springs, N. Y.—[ADV. 16]

CORDS, Switchboard & Telephone—Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago 41, Ill.—[ADV. 17]

CROSS ARMS—American Cross-Arm, Inc., 141 W. Jackson Boulevard, Chicago, Ill.—[ADV. 18]

DERRICKS—Set more poles with aluminum derricks. Aluminum Co. of America, 1407C Gulf Bldg., Pittsburgh 19, Pa.—[ADV. 19]

"EARTH BORING MACHINES" Sterling Model "A"—Precision Engineered and Hydraulic Controlled. Sterling Engineering & Mfg. Co., 173 Gilligan St., Wilkes-Barre, Pa.—[ADV. 20]

ELECTRIC HOT WATER HEATERS, Thermostatically controlled for any hot water heater, Vulcan Electric Co., Danvers 17, Mass.—[ADV. 21]

ENGINEERING, Construction—Neale Construction Company, 432 Crane St., Topeka, Kans.—[ADV. 22]

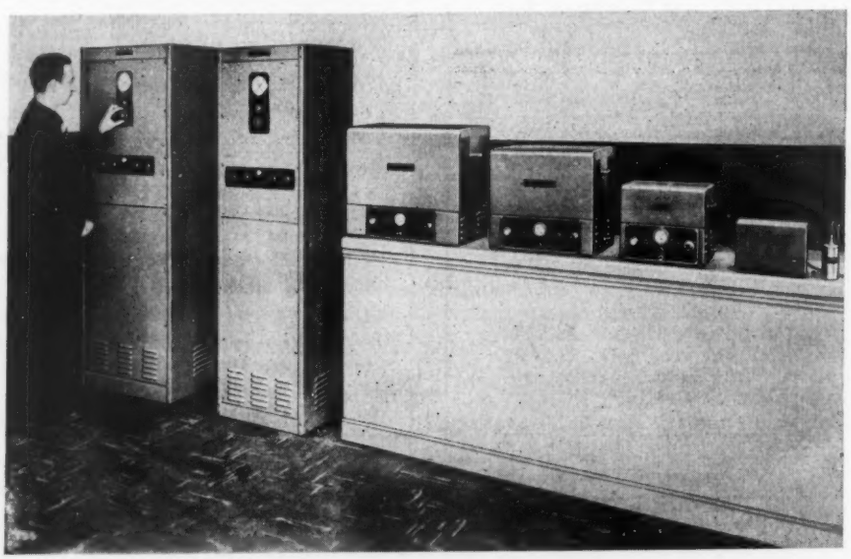
GENERATORS—A. C. power anywhere with "Katolight" plants and generators. Kato Engineering Co., 131 Maxfield Ave., Mankato, Minn.—[ADV. 23]

FURNACES—For quickly and economically melting lead and paraffin—Mutual Liquid Gas Equipment Co., Inc., 3600 W. Imperial Highway, Los Angeles, Calif.—[ADV. 24]

INSPECTION SERVICE—For poles, crossarms, and preservative treatments. Inspectors stationed throughout U.S.A. A. W. Williams Inspection Co., Mobile, Ala.—[ADV. 25]

INSULATORS, Porcelain—Porcelain Products Inc., Box 300, Findlay, Ohio.—[ADV. 26]

JACKS, for lifting Cable Reels, Pulling Poles and Maintenance Work. Duff-Norton Mfg. Co., 1710 Preble Ave., Pittsburgh 12, Pa.—[ADV. 27]



DEHYDRATORS:—*Communication Products Co., Inc., announces production of a new line of improved dehydrators featuring automatic, continuous operation and delivery of air at lowest dew point.*

Many models are available with capacities to meet any requirement. Model 105-107 fully automatic Auto-Dryaire Dehydrator is the largest of the line. Intended to serve the electronic and communications industries, where sources of dry air having low dew points are required, Model 105-107 is capable of delivering air for servicing volumes up to 200 cu. feet. This model is designed to purge and pressurize the largest wave guide and transmission line installations. A floor model 66 7/8" high, it has an output of 3 CFM without interruption and is entirely automatic.—Check New Product 308.

LIGHTWEIGHT PULLERS—Coffing Hoist Company, 800 Walters St., Danville 5, Ill.—[ADV. 28]

PIPE PUSHERS—Giant Manufacturing Co., South 6th St., at 12th Ave., Council Bluffs, Iowa.—[ADV. 29]

PIPE PUSHERS—Greenlee Tool Co., 2136 12 St., Rockford, Ill.—[ADV. 30]

PINS & BRACKETS—Mfrs. of all sizes of Locust Pins and Oak Brackets, The Locust Pin Co., Inc., Front Royal, Va.—[ADV. 31]

POLE HOLE DIGGERS—For derrick mounted trucks. Tel-E-Lect Products, Inc., 9613 Minnetonka Blvd., Minneapolis 16, Minn.—[ADV. 32]

POLES—Cedar poles and Fir cross arms. R. G. Haley & Co., Inc., Spitzer Bldg., Toledo 4, Ohio.—[ADV. 33]

POLES, Southern Yellow Pine—Colfax Lumber & Creosoting Co., Inc., P.O. Box 23, Pineville, La.—[ADV. 34]

POLES, Creosoted Southern Yellow Pine and Douglas Fir. The Long-Bell Lumber Company, Wood Preserving Div., R. A. Long Bldg., Kansas City, Mo.—[ADV. 35]

POLES, Southern Yellow Pine—Taylor Colquitt Company, 290 E. Main St., Spartanburgh, S. C.—[ADV. 36]

POLES, Southern Yellow Pine—Texas Creosoting Co., Orange, Texas.—[ADV. 37]

POLES—Texas Best pressure-creosoted poles. Lone Star Creosoting Co., P. O. Box 9, Longview, Texas.—[ADV. 38]

POLES—Western Red Cedar, Western Larch, Lodgepole Pine. B. J. Carney & Co., Minneapolis 3, Minn. and Spokane 8, Wash.—[ADV. 39]

POLES & CROSS ARMS—Creosoted poles and crossarms. Conroe Creosoting Co., Conroe, Texas.—[ADV. 40]

PROTECTIVE EQUIPMENT—Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Ill.—[ADV. 41]

GAS-TITE CABLE TERMINALS—Sub station protectors, main dist. frames; central office protectors; interior junction boxes; lightning arrestors.—Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.—[ADV. 42]

PRINTING—Telephone forms, Cullom & Ghertner Co., 600 21st Ave., Nashville 4, Tenn.—[ADV. 43]

REBUILT TELEPHONE EQUIPMENT—USED EQUIPMENT BOUGHT AND SOLD—Independent Telephone Repair Co., 2137 W. 21st St., Chicago 8, Ill.—[ADV. 44]

REBUILT TELEPHONE & SWITCHBOARDS—Telephone Repair & Supply Company, 1760 Lunt Avenue, Chicago 2, Ill.—[ADV. 45]

SUPPLIES—New all metal heavy duty extension loud ringers; ready wire reels, payout only and payout and takeup in one.—Suttle Equipment Co., Lawrenceville, Ill.—[ADV. 46]

TELERING—Telephone ringing by frequency conversion. Voltage range for all purposes, central office and private branch exchanges. Telkor, Box 186, Elyria, Ohio.—[ADV. 47]

SWITCHBOARDS, TELEPHONES, ETC.—Automatic Electric Co., 1033 W. Van Buren St., Chicago, Ill.—[ADV. 48]

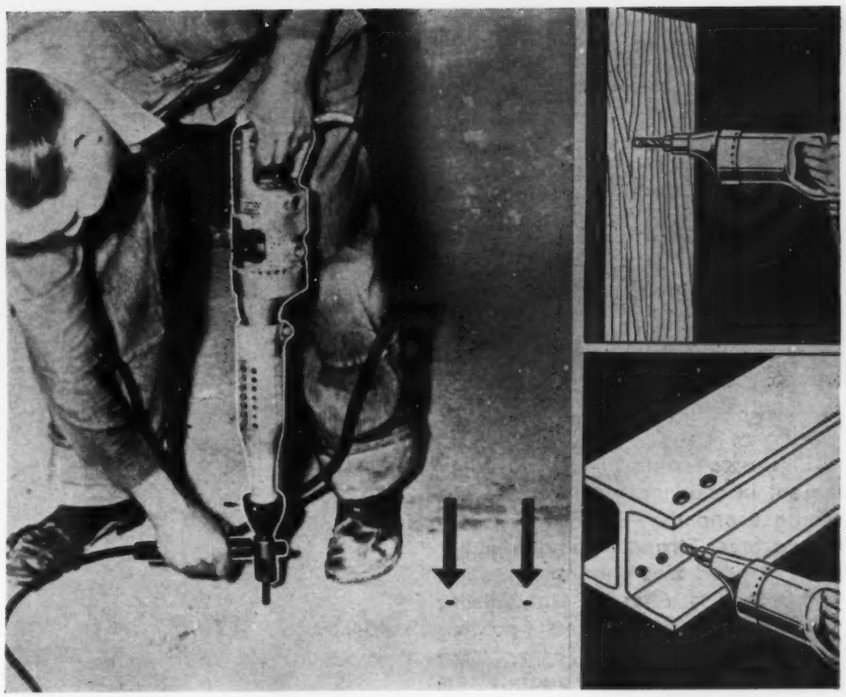
SWITCHBOARDS, TELEPHONES, ETC.—The North Electric Manufacturing Company, Galion, Ohio.—[ADV. 49]

TRUCK BODIES—Highway Trailer Co., Edgerton, Wisc.—[ADV. 50]

TRUCK BODIES AND EQUIPMENT—McCabe Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.—[ADV. 51]

WIRE DROP & INSIDE—Jackets of neoprene, rubber or plastic. Lowell Insulated Wire Co., Lowell, Mass.—[ADV. 52]

WIRE, Insulated—DATED DROP WIRE—Neoprene or Weatherproof—Alphaduct Wire & Cable Co., Milltown, N. J.—[ADV. 53]



***ELECTRIC HAMMER:**—The Wodack "Do-All" utilizes its one motor for performing three different types of work, namely; (1) Drilling concrete and masonry; (2) drilling metal and wood, and (3) driving, grinding, buffing and wire wheels. Thus, this combination makes the "Do-all" an electric hammer, an electric drill, and an electric grinder.*

The "Do-All" is fully equipped with ball-bearings with sealed lubrication, and is built throughout to stand up under hard, continuous usage. The tool is operated by a powerful universal motor with fan ventilation and has the switch conveniently located in the handle. Any lamp socket runs it—either direct or alternating current of from 25 to 60 cycles. It also has a 10-foot cord with strain reliever. The body of the unit is made of aluminum alloy and the complete weight of the tool, ready for use, is only 15 pounds.—Check New Product 309.

WIRE, Insulated Drop and Bronze or Copperweld—Acorn Insulated Wire Co., Inc., 36 Freeman St., Pawtucket, R. I.—[ADV. 54]

WIRE, Insulated Drop, Genuine Ironite—Paragon Electric Co., Two Rivers, Wis.—[ADV. 55]

WIRE, Insulated Drop, HT Bronze, Paraprene or Braid Insulation—Paragon Electric Co., Two Rivers, Wis.—[ADV. 56]

WIRE, TELEPHONE, for all inside and outside uses—Whitney Blake Company, New Haven, Conn.—[ADV. 57]

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Please forward complete information on the following products and services described in the March, 1951 issue of TELEPHONE ENGINEER AND MANAGEMENT. (Check information desired.)

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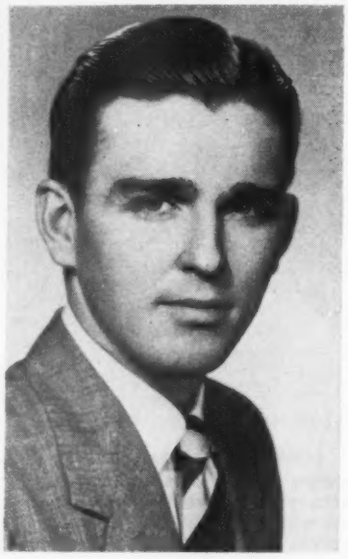
This book familiarizes you with every component of transmission lines—electrical fundamentals and electric circuits, the electric system from generation to distribution, even a chapter showing how transmission lines are designed. Descriptions of all the materials of line construction; poles, conductors, hardware, tools, electrical apparatus, etc., are also supplied. With this sort of background, every line of the chapters on construction, testing, and maintenance that follow are twice as valuable.

Order from:
Telephone Engineer Pub. Corp.
7720 N. Sheridan Rd., Chicago 26, Ill.

Stromberg Advances Cleland and Connors

ANNOUNCEMENT has been made of the appointment of two sales representatives, Robert E. Cleland and Lloyd I. Conners, who will serve the Telephone Division of the Stromberg-Carlson Co., Rochester, N. Y. Ac-



Robert E. Cleland will represent Stromberg-Carlson's Telephone Division in Western Ohio.

cording to Arthur F. Gibson, divisional general manager, Mr. Cleland will represent the company in Western Ohio and Mr. Conners in Oklahoma Territory formerly covered by E. G. Browell.

Mr. Cleland has been with Stromberg-Carlson since 1940, working as an installer and recently as an installation foreman. As sales representative in Ohio he will cover the territory formerly handled by Walter E.

Lloyd I. Conners, new Stromberg-Carlson Telephone Division representative.

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FROST EARTH AUGER*

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It will drill through flint-hard Frozen Earth, Shale, Sandstone, Gumbo, Clay, Gravel, and Dry Hard Packs.

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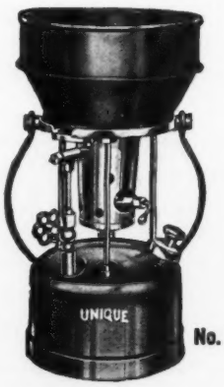

No. 55

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Melts 50 lbs. of solder in 10 minutes.
Scraper cleans orifice safely, automatically.

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TELEPHONE MAINTENANCE EQUIPMENT

UNIQUE MFG. CO., INC., Est. 1921
224 W. Walton St., Chicago 10, Ill.

Carlson, who recently resigned from the company because of ill health.

Mr. Conners began service with the company in 1935. He is a native of East Rochester and attended Rochester Institute of Technology, taking courses in Mechanical Engineering. Mr. Conners takes over the territory formerly covered by E. Gwynne Browell. Mr. Browell has been assigned to the Texas area previously served by William E. Lyon, who resigned from the company last year. Kenneth J. Johnson will continue as sales representative in the Nebraska territory.

D. L. Harrington Heads Donnelley Exec. Committee

D. L. HARRINGTON, vice-president of the Reuben H. Donnelley Corp., Chicago, was recently elected president and chairman of the executive committee of the company.

Harrington, who will make his headquarters in Chicago, succeeds Raymond M. Gunnison of New York

D. L. Harrington

who became board chairman. Elected as board vice-chairman was Gaylord Donnelley, an executive vice-president of R. R. Donnelley & Sons Co.

Harrington joined Donnelley in 1922 when the company purchased a mailing list firm in Nevada, Iowa, of which he was a partner. First as production manager of the Donnelley direct mail division and later as general manager, he built the division into one of the largest organizations of its kind in the world.

In 1943 he became vice president and at that time became active in the management of the company's classified telephone directory operations.

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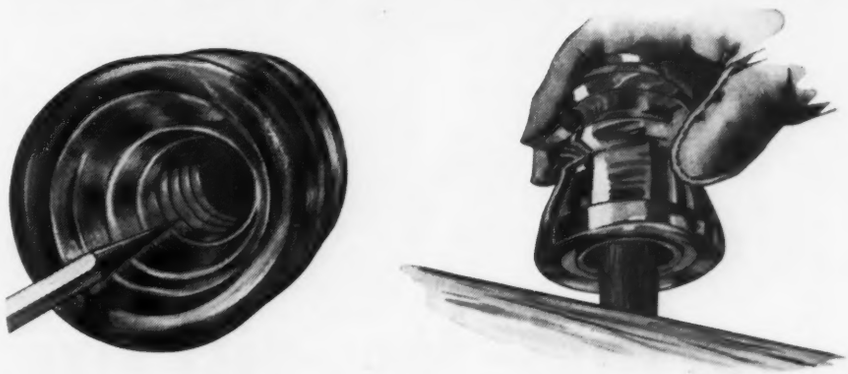

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Arthur Reese Appointed Motorola Market Manager

ARTHUR L. REESE, formerly manager of Motorola's Communications and Electronics Division west coast region, has been appointed marketing

Arthur L. Reese, new Motorola marketing manager for Microwave and Carrier and Control Sales.

manager of the Microwave and the Carrier and Control sections of the company.

Starting as a sales engineer, Mr. Reese has served the company during the past 15 years in its field sales organization. He has been headquartered in Los Angeles, St. Louis, Chicago, Seattle, and San Francisco. Prior to his direct employment by Motorola he was associated with the company's products through its distribution and service organization.

HERE'S Half a Ton OF Pull — TOOL-BELT SIZE!

The New 1000-lb. Mighty Midget Puller

ONLY $31.00

(500-lb. Model $21.75)

Combining easy portability with added pulling power, the new Coffing Mighty Midget does *more* jobs, does them *easier*. Only 9½ lbs. in weight, it hangs easily on a lineman's tool belt. Full half-ton capacity gives it plenty of power for stretching long spans of wire, raising heavy equipment, tightening guys — many other pulling and lifting jobs. Convenient 2-way handle serves as a lever or high speed crank.

Equip your crews with these new, stronger mighty midgets. See how their added strength and tool-belt portability speed maintenance and new construction. Write for Bulletin U3MP.

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Quik-Lift Electric Hoists • Hoist-Alls • Safety-Pull Ratchet Lever Hoists • Spur-Geared Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

DANVILLE, ILLINOIS

Highway Trailer Advances Hobek

APPOINTMENT OF C. C. Hobek as Philadelphia branch manager of the Highway Trailer Co. has been announced by L. E. Craig, vice president in charge of sales. Mr. Hobek has served until recently as manager of the Pittsburgh branch and is being assigned to Philadelphia as part of a plan to expand facilities and services in the area.

A part of Mr. Hobek's new assignment in Philadelphia will be the development of a self-contained service department at the branch. Highway's growth in the area has made these facilities a necessity. The company's utilities vehicles and equipment will be serviced as well as all types of commercial trailers.

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THE BACK OF THE BOOK

"Invite the Folks In . . ."

by John G. Reynolds

"Showing off" equipment and methods is good business for the telephone company. The cost of holding open-house is low; benefits are high.

LAST YEAR, telephone companies shifted their open-house programs into high gear. Independent and Bell companies invited folks in to look over their central offices and the folks liked it!

Just for example: Figures recently compiled by Southwestern Bell show that nearly 200,000 people—an all-time high—paid behind-the-scenes visits to 95 S. W. Bell telephone offices. This is more than double the number of "callers" of any previous year in company history.

To S. W. Bell, this expansion represents the post-war open-house program in full swing . . . after the completion of its first full year of operation. Today the activity continues at a good clip, bypassing, however—for security reasons—telephone offices serving important military installations as well as a few of the large toll offices.

Undoubtedly the biggest success factor in the 1950 activity was telephone people themselves—the thousands of men and women who succeeded in giving local townspeople a friendly, first-hand picture of what makes the telephone business tick. They conducted visitors on tours of telephone buildings, covering everything from batteries to leisure rooms for operators. They staged equipment demonstrations, manned special exhibits and answered hundreds of questions about the business.

Typical of the many successful open houses were those at Port Arthur, Tex., where 1,250 people a day flocked to the four-day event; Marshall, Mo., where a three-day attendance totaled 3,042; Marysville, Kan., which handled 2,597 guests; and Eldorado, Kan., which played host to 2,594.

A telephone family night preceded virtually every open house, giving employees and their families first chance to see exhibits and tour buildings. The advance program also served as a dress rehearsal for the public party.

At Mangum, Okla., an informal "family visit" attracted so many other folks that the activity—like Topsy—"just grew" right then and there into a spontaneous open house.

The favorable results experienced by companies sponsoring open-house programs are: (1) an increased understanding of telephone problems—held orders, regrade requests, deferred service improvements—and (2) a greater awareness of telephone service problems.

Typical of this understanding are comments made at the Chillicothe, Mo., open house. "The telephone rates were recently raised here 25 cents a month," said a visitor, "but after seeing all this necessary equipment, it seems it should have been more."

Another subscriber remarked, "I won't complain about the bill now that I have seen what it takes to furnish telephone service."

And the value of the open-house program does not stop with improving the company's position with its subscribers; the home town papers cover the event and comment upon it in their editorial columns.

For example, the Emporia, Kan., Gazette commented: ". . . Necessarily, the telephone business is a monopoly, but the open house idea proves that the company realizes it is a public utility and that it is always ready to take the public into its confidence as to how the system works . . .". In Sexton, Tex., the Enterprise said: ". . . It would be nice and certainly in order, we think, to turn the open house over at the telephone building into a sort of telephone operator appreciation affair. Smile when the girls greet you and tell them you appreciate their work . . . Not only the operators, but the workers who repair lines and make installations have done their job well . . .". In Lawton, Okla., the Constitution reported: "Persons attending . . . will have a better understanding of the problems of the 177 local operators who battle through a maze of lights, plugs and buzzes for hours on end to give the customer the fast, cheery service that he expects. They'll learn that it takes a lot of doing. . . . Also, they'll understand why it takes time to get a new telephone installed".

The Norton, Kan., Daily Telegram hit the proverbial nail on its battered head when it commented: ". . . Knowledge of telephone operations . . . might help to effect an understanding of what the telephone companies are talking about when they put in bids with the government for rate increases.

"Since government action, a great deal of the time, is based upon public opinion, such opinion should be based upon intelligent comprehension of factors involved. A good way to gain such comprehension would be to accept the phone company's invitation to the three-day open house."

All of this adds up, we think, to a shining halo for the open-house program. Everybody likes to have good neighbors; the family next door, friends down the street.

A direct method for obtaining good neighbors is the open-house. The cost is low; the benefits high. In fact it would be hard to find a better buy!

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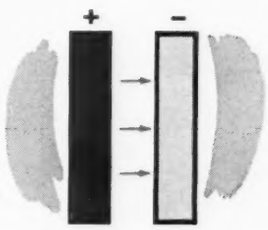
The Battery that Lasts Practically Forever!

1. *Batteries on full float service require a small current to offset normal self-discharge. This self-discharge is due primarily to migration of antimonial impurities from the positive grids or grid frames to the negative plates.*



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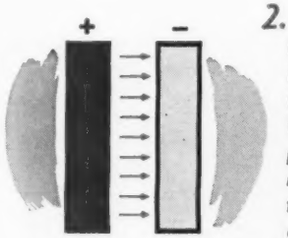
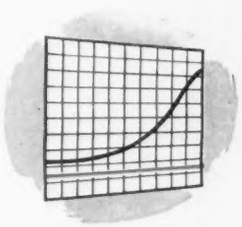


2. *In ordinary batteries as the self-discharge rate increases, more and more antimony is transferred to the negative plates. The cycle is repeated with increasing tempo until the positive grid fails completely.*

3 *Gould Planté Batteries contain no antimonial impurities. Therefore, their voltage requirements and capacity remain constant throughout their amazingly long, low-cost life.*



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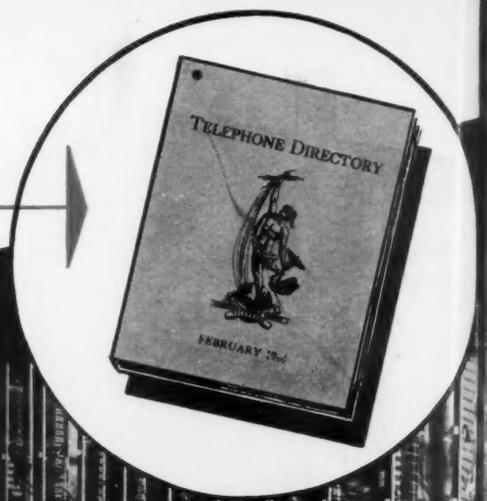


not this . . .

Every year telephone companies spend thousands of dollars on new central office equipment. They employ specialists to design and manufacture this equipment in order to improve telephone service for their subscribers.

However, subscribers rarely see this sparkling new equipment; in fact, most subscribers are not even aware of the time, money, and energy spent in the routine maintenance of such equipment.

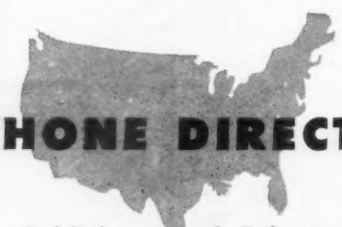
Yet, many of these same telephone companies issue directories that are not designed to give maximum subscriber satisfaction. These directories are apt to have no classified section; instead they have advertising scattered throughout the alphabetical pages, or they may have the covers so cluttered with advertising, that it is hard to find the name of the telephone company.

Telephone companies which issue directories like these are overlooking the fact that their subscribers judge them by the directories they issue.

Like your central office equipment, your telephone directory deserves the attention of a specialist. The telephone companies which use our Complete Directory Service Plan* are freed from all the problems that normally accompany directory publishing. And, they issue telephone directories to their subscribers that are accurate and attractive—designed for maximum subscriber satisfaction. In addition, the directories we publish produce larger net profits for the telephone companies.

Why not get complete details concerning the specialized services of our organization from our nearest representative, today?

***Our service includes the sale of classified advertising, compilation, proof reading, layout and printing.**



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